#1 Atari Computer Magazine



Antic®

The ATARI® Resource

OCTOBER 1984 VOLUME 3, NUMBER 6

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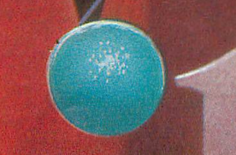
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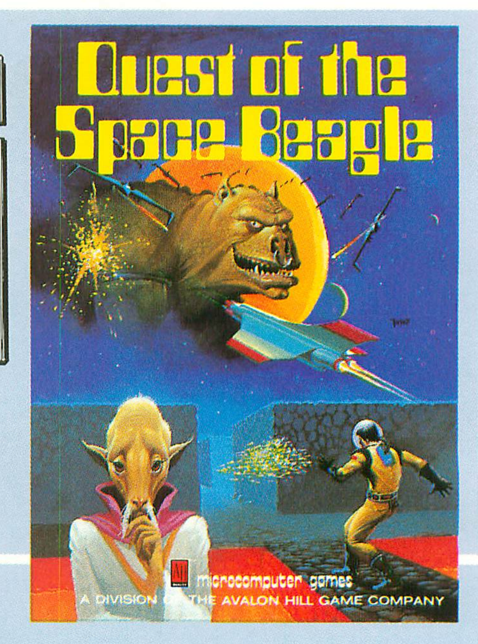
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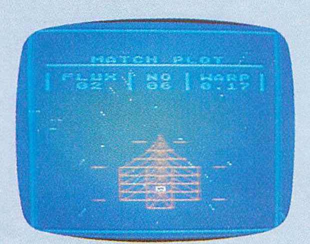
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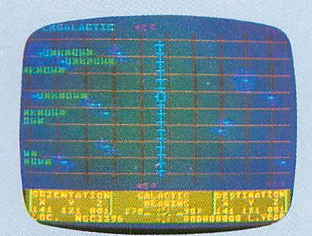
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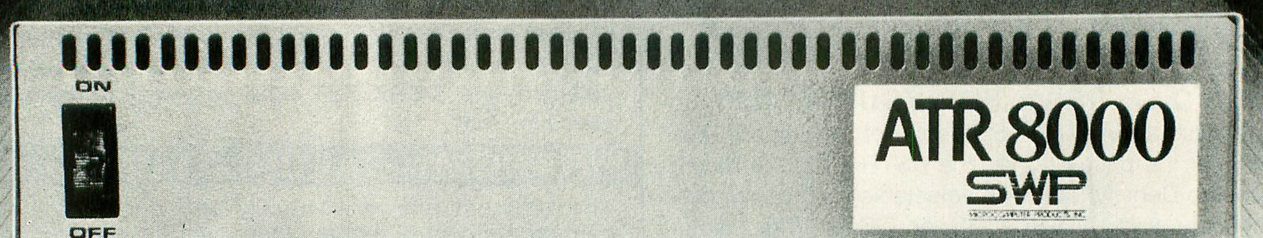
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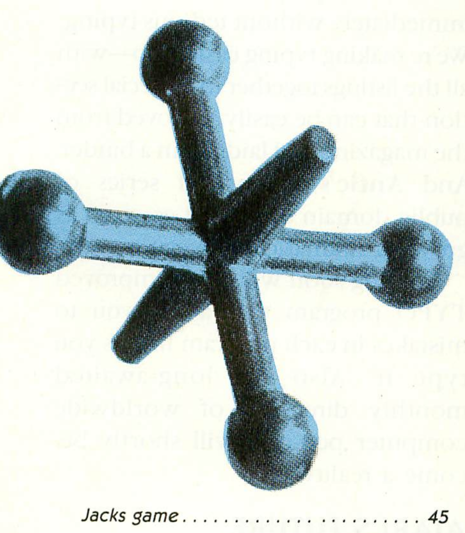


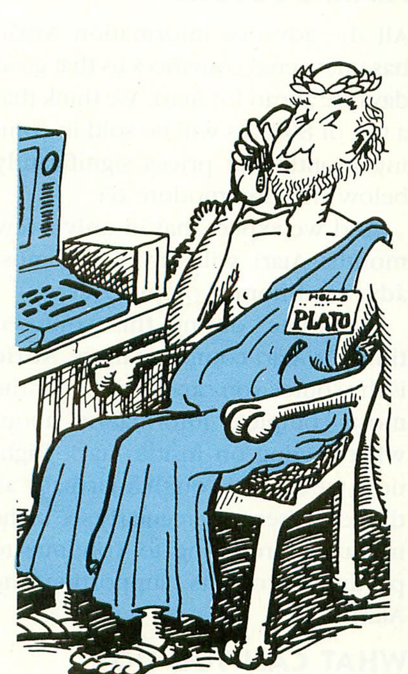
The ATARI® Resource OCTOBER 1984, VOLUME 3, NUMBER 6

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October 1984
Volume 3, Number 6
ANTIC—The ATARI Resource is published twelve times per year by Antic Publishing. Editorial offices are located at 524 Second Street, San Francisco, CA 94107. ISSN 0745-2527. Second Class Postage paid at San Francisco, California and additional mailing offices. POSTMASTER: Send address change to **Antic**, 524 Second Street, San Francisco, CA 94107.

Editorial submissions should include program listing on disk or cassette, and text file on media and paper if text was prepared with a word processor. Media will be returned if self-addressed stamped mailer is supplied. **Antic** assumes no responsibility for unsolicited editorial material.

editorial

Dramatic changes are now being made at the Atari Corp. by its new owners. And **Antic** Magazine, the #1 publication for Atari computer users, is taking major steps to become the central clearinghouse of information for our readers.

USERS GROUPS

Antic already has an active notefile on Plato. We're investigating ways to start a special bulletin board for users groups.

This new BBS would organize regular nationwide users group teleconferences. It would set up product surveys by user group members, allowing **Antic** to print super-accurate product ratings. And it would generally fill the vacuum by providing a clearinghouse for national users groups.

DIRECT MARKETING

Right now it's becoming harder for small independent manufacturers to profitably market Atari software and peripherals. **Antic** is preparing to offer readers selected products directly by mail.

All **Antic** subscribers will be mailed our latest catalogs, and other readers may send in requests for a catalog. Each issue of **Antic** will also feature our latest direct-mail offers.

APX

We're trying to contact all authors of software formerly marketed by the Atari Program Exchange. Please get in touch with the **Antic** Catalog Manager so that we can make your programs available again—in fact ALL THIRD PARTY VENDORS who want **Antic** to distribute your products should contact our Catalog Manager.

NEW ANTIC FEATURES

Antic has made a number of significant improvements that come together in this issue. We now offer a magazine + disk package that lets you use all the programs in the issue immediately without tedious typing. We're making typing easier too—with all the listings together in a special section that can be easily removed from the magazine and laid flat in a binder. And **Antic**'s low-priced series of public domain disks and cassettes is growing dramatically every month.

Coming soon will be an improved TYPO program that alerts you to mistakes in each program line as you type it. Also the long-awaited monthly directory of worldwide computer pen-pals will shortly become a reality.

ATARI'S FUTURE

All the advance information **Antic** has uncovered convinces us that great days are ahead for Atari. We think that a ton of 800XLs will be sold in coming months—at prices significantly below the Commodore 64.

And we expect that in only a few months Atari will unveil the most advanced home computer ever.

Meantime, during this confused time for Atari computer users, **Antic** is the source you can count on for the most complete information about what's going on inside Atari. Right now we can tell you that virtually all the advertisers you regularly see in the magazine are going to continue to produce products supporting the Atari.

WHAT CAN YOU DO?

Let your computer accessory retailers know that you're still in the market for Atari add-on products. If you can't find the software or peripherals that you're interested in at local stores, contact the manufacturers directly. Use the phone numbers you'll regularly find in **Antic** and let the companies know you read about their products in this magazine.

James Capparell
Publisher

i/o board

OPERATING SYSTEM IDENTIFICATION

In **Antic**, April 1984, it was mentioned that A=USR(61733) reboots the system as though just powered up (page 10). It works on non-XL models. On my 1200XL, Error 9 shows up. Fix this by using A=USR(58487), which is the cold start entry point for ALL models. If you wish to reset only, without pushing the RESET button, use A=USR(58484) in your program.

Now, a question. Is there an easy way to determine the identification of an Atari computer system, including revision numbers and dates, by PEEKing locations in the Atari?

John Fronheiser
Pottstown, PS

Atari has gone through six Operating Systems. The older 400/800's both contained identical OS's and went through revisions A and B. There were two OS's for the 1200XL, referred to as 10 and 11 at Atari. The new 600/800XL's have had revisions 1 and 2. If location 64728 contains 162, you have a 400/800, otherwise you have an XL. To determine which 400/800, look in location 65528. A 221 there means you have revision A, 214 means revision A PAL, 243 means revision B, and 34 is revision B PAL.

If you have an XL computer, you can test for the OS at location 65527, where a PEEK will generate the revision numbers 10, 11, 1 or 2. —ANTIC ED

DESERT NEWS

In your March 1984 issue, The International Atari, you said only Atari game machines are available in Saudi Arabia. Actually, Atari 400s and 800s are, and have been, available for at least a year in many stores. However, there are very few Atari owners with disk drives, making it hard to trade games.

Incidently, I find it extremely hard to read control characters used in **Antic** listings. Is there any way around this? That aside, **Antic** is the oasis in my desert.

Dan Herron
Dhahran, Saudi Arabia

Thanks for the kind words and the information. Regarding our control characters: we frequently use character strings, instead of data statements, to save memory space. Here's a tip that may help reading those strings—in the typeface font we use for our listings, most control codes are squarish, and most inverse alphanumeric characters are rectangular. —ANTIC ED

TRANSLATOR TAPE?

I own an Atari 1200XL, and would like to know if the Translator, produced in disk form by Atari, could be on a cassette tape.

Richard Lowery
Akron, OH

The disk version of Translator takes about 20 seconds to boot and must be rebooted for each new program requiring the old OS that you load. The Translator requires an XL computer with 64K RAM, but most cassette owners have only 16K. Most Atari owners with 64K have disk drives.

A cassette version of Translator would take several minutes to load, in addition to loading time for the application. Such time can be frustrating—buying a disk drive would make more sense. —ANTIC ED

DOING MORE WITH DOS 2.0

A few technical errors popped up in my article "Do More With DOS 2.0" (August 1984). Here are some clarifications. Under modified DOS 2.0, only 963 of the possible 1040 sectors are accessible, resulting in a total formatted storage capacity of 123,264 bytes.

Also, the actual DOS modification procedure (page 32) should be performed as follows: before performing the BASIC POKEs, boot your system with a standard DOS 2 disk and leave the disk in the drive while POKEing. When you've completed the POKEs, use this easier procedure: type DOS [RETURN] and wait for the DOS menu to appear. Remove your standard DOS disk now and insert a blank disk for formatting. Use the "I" menu option as usual to format the new disk and then use the "H" option as usual to save the DOS files. Then proceed with copying other files as indicated.

Richard Kruse
Witchita, KS

continued on next page

i/o board

MORE MEMORY?

All 600XL and 800XL owners know that there is a special opening in the back of their computers. Can I insert a 64K card (made by MPP) into the 800XL? Will I have 128K?

Michael Keylin
Brooklyn, NY

The addressing bus on the 800XL will only see 64K. You can plug in the MPP 64K module, but the computer will then use the MPP 64K and not its own. In other words, instead of adding 64K, you're switching 64K. —ANTIC ED

SAVING AN ADVENTURE GAME

I'm writing an adventure game on my Atari 800XL and would like to offer the player the option of saving the game in progress for later playing. How can I do this?

Michael Keylin
Brooklyn, NY

You must determine which variables contain status information on the course of the game and write two subroutines. One should save the value of these variables to disk in a predetermined order and the other should read the values from the disk in reverse order and place them in the proper variables. For example: OPEN #1,8,0,"D:ADV.DAT":PUT #1,FLAG: PRINT #1,ROOM$ . . . etc. To retrieve: OPEN#1,4,0, "D:ADVDAT":GET #1, FLAG: INPUT #1,A$, . . . and so on. To get an idea of which variables you need, see our variables cross-reference article in the August 1984 issue. Good Luck!

—ANTIC ED

PLATO ARISES

I was very impressed with the article Plato Rising (**Antic**, July 1984). Is Plato compatible with the MPP 1000C modem? Would you list all the modems with which Plato is compatible? Where can I get the Plato cartridge?

Kendel Bennett
Brigham City, UT

Plato is compatible with any popular modem, including the MPP. As for cartridges, you might contact Computer Creations (see the advertisers index in the back of this issue.) —ANTIC ED

ENDING ATARI CABLE CHAOS

Although my Atari is a wonderful machine, a complete system can be very untidy and cumbersome, especially compared to some of the newer compact models on the market.

I solved the problem of chaos caused by my Atari 800, monitor, two disk drives, 850 interface, modem, printer and printer buffer, as well as the attendant wires, by encasing much of the system in an IBM-type box. Now the drives, disk controller, 850, printer buffer and all of the power supplies are all housed in a compact, transportable package. The modem sits on top of the case and few cables clutter my shelves.

Mike Palmer
Tampa, FL

CRUEL I/O

I cooked this little ditty up one day when I was feeling masochistic. I wrote it in response to the novices' worries about hurting the computer through the keyboard.

```
5 GRAPHICS 0:HI=0
6 POKE 764,255:? "Hi there! What's your name?";
7 IF PEEK(764)=255 THEN 7
8 GRAPHICS 2+16:POKE 708,14:POSITION 5,5:? #6;"DANGER!!!":SOUND 0,12,252,15
9 FOR I=1 TO 200:POKE 712,PEEK(53770):NEXT I
10 FOR I=1 TO 50
15 POKE 560,PEEK(53770):POKE 561,PEEK(53770):POKE 708+INT(RND(0)*5),PEEK(53770):POKE 623,PEEK(53770)
20 POKE 756,PEEK(53770):POKE 559,PEEK(53770):POKE 53760+INT(RND(0)*9),PEEK(53770):NEXT I
30 GRAPHICS 0
40 SOUND 0,0,0,0:SOUND 1,0,0,0:SOUND 2,0,0,0:SOUND 3,0,0,0
45 IF AARD=255 THEN POKE 764,255:? :? "Do you dare try again?":END
50 IF NOT HI THEN ? "Hee, Hee.":? "But, seriously..":HI=1:GOTO 6
60 ? "Never trust a computer with a sense"
70 ? "of humor. (I can't believe you fell":? "for it two times in a row!)"
80 POKE 764,255:? :? "READY"
90 AARD=255:GOTO 7
```

Chris Page
San Diego

LOCKED OUT OF AN ATARI

After using my Atari 800 for about 20 minutes, I find that it frequently locks up or scrambles my code. In the lock-up situation, all the keys function fine—until I press the [RETURN] key, when everything except the [SYSTEM RESET] locks up. Pressing the [RESET] key works, and the machine is fine until I press [RETURN] again.

My computer also adds, deletes and changes lines of code as it sees fit.

These problems only occur when the BASIC cartridge is inserted. What should I do?

Will Cronenwett
Norman, OK

Sorry to hear of your troubles. The problem probably lies with your BASIC cartridge. A new, fully debugged BASIC cartridge, Revision C, is now available for $15 from Atari Customer Relations, 1312 Crossman Ave., P.O. Box 61657, Sunnyvale, CA 94088. —ANTIC ED

RADIO ATARI

I need information on a modem to run with my radio transmitter and Atari 800. It would have to be able to send and receive Morse Code, ASCII and radioteletype (RTTY). Can you help?

Roy Whiteside
Newcomb, Australia

You will find a review of the RM1000 radio modem on page 89 of our July 1984 issue. Also, you might wish to contact the folks at Ad Astra, the journal of the Atari Microcomputer Net and Amateur Radio Operator Users' Group. Their address is 4749 S.R. 207 N.E., Washington C.H., Ohio 43160. —ANTIC ED



THE WIZARD REVISITED

In July's Help! section, there is an error regarding the program for "Math Wizard," (**Antic**, April 1984). As noted in July, there is an error in line 50 of the program listing, the 17th character should be an inverse-video zero instead of the capital letter O. If you put in this correction, the TYPO Table will read as published. However, if you copied the original error (corrected above) the code letters at line ranges 5 through 60 will be CH rather than GA.

BUGGED NUMBERS

The renumbering utility in the July 1984 issue (Spaced Out Numbers) has a slight bug. Surprisingly, it works fine on the XL's, but will not recognize line numbers over 10,000 on the older Atari 400's and 800's. The fix, for non-XL owners only, is to change line 31040 as follows:

```
31040 D=INT(VAL(C$)/INT(100^
      (68-B(0))+1.0E-03))
```

The only addition is the +1.0E–3.

Tom Anderson
Chicago, IL

FEEDING YOUR FLOPPIES

The article "The Care and Feeding of Floppy Disks (**Antic**, August 1984, page 90), states that you cannot format the back sides of disks on a Rana disk drive without punching an extra timing hole. Similarly, the table (page 80) accompanying the disk drive survey in the same issue indicates that you cannot format the back sides of disks with a Rana. This is incorrect; the back sides of all disks can be readily formatted with the Rana drive.

AMODEM QUOTES

There is an error in the instructions for AMODEM, (**Antic**, July 1984, page 21). In the procedure for R-Receive (and others that include specifying filenames), do not include quotes when you type in filenames.

ESCAPE FROM EPSILON

I ran "Escape from Epsilon" on my 1200XL and all I get is an orange screen with a grey colored bar on the left side of the monitor screen. What is the problem?

Vytas Banionis
Los Angeles, CA

This problem, as well as quite a few other errors, plagued a number of readers attempting to run "Escape." We typed in the program from the magazine itself. The TYPO Table matched and the program ran as it was supposed to, so we know the program runs as published. There are no errors in the program, and many who initially had problems entering the program have succeeded in getting it to run properly.

However, in Line 500, POKE 559,0 turns the screen off, so if an error is generated while the screen is blank, you can't see it. Try changing the 0 to a 34. This will allow you to see the screen and watch your progress. —ANTIC ED

PRINTER INTERFACE

In a recent issue, you stated that "the MPP-1150 printer interface could be used with all models." Actually, if you own a 1200XL, you must buy the MPP-1150XL interface, for the same price ($99.95).

Michael Keylin
Brooklyn, NY

The MPP-1150 works with all Atari models (including the 600XL and 800XL) except the 1200XL. If you own at 1200XL and have bought an MPP-1150, return it to Microbits for a free exchange.

—ANTIC ED

BOOLE'S LOGIC

There are two errors in one program line in "Logic According to Boole" (**Antic**, August 1984). Line 30 on page 51, which is the last line on the page, should read:

```
30 Y=Y+(INT(S/4)*4=S-1)*(Y<19)-
   (INT(S/2)=S/2)*(Y>0)
```

Note that the penultimate operator is *, not –, and that there is only one final right parenthesis.

TANKS FOR THE HELP!

In the June 1984 article on Player/Missile Tanks, (page 53), line 1310 contains a character that looks like a semicolon. It's actually a colon.

MORE WITH DOS

The article "Do More with DOS 2.0" (**Antic**, August 1984, page 31), describes how to enhance DOS 2.0 to use with an Atari 1050 disk drive for increased disk storage capacity. Disks formatted with the revised DOS are not compatible with existing sector-copier programs for DOS 2.0, such as SCOPY 810. If you copy an "enhanced-density" DOS 2.0 disk with one of these utilities, it will only copy the first 720 sectors, and DOS won't be able to access the remaining sectors on the copy. The only way to copy files with the modified DOS 2.0 is with the DOS menu's C function for multiple-drive systems, or the O function for single-drive systems. Also, sectors on disks created this way still only contain 128 bytes each—but there are more of them.

WRONG COURTYARD

One of the BBS telephone numbers in "Let's Play Password," (**Antic**, August 1984) is incorrect. The correct telephone number for the Courtyard BBS is (312) 668-6272.

EVEN MORE DOS2

There is a typographical error in our August 1984 issue in the article "Do more with DOS2," pages 32. Under Step 1, there is a line of instructions that starts X10. This should read XIO. That's a capital X, a capital I and a capital O, not a zero.

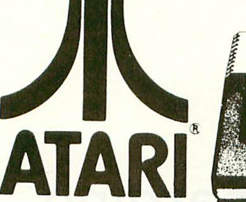
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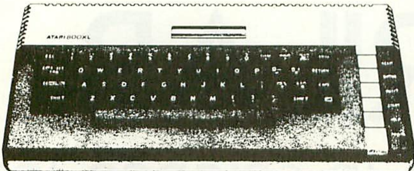
In the April 1984 issue, "Update Disks with Note and Point" has an error. Lines 410, 440, 470, 500, and 530 should each begin INLEN=LEN(USER$).

E.A. Hargrove
Clute, TX



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ATARILAB

New breakthrough in science learning

by CHARLES JACKSON
Antic Staff Writer



"Good morning, class. Sit down at your lab stations, open your books to page 28, and put the Temperature cartridge into your Atari computers. Today, we'll calculate the dew point temperature. Can anybody tell me what 'dew point' means?"

Scenes like these are becoming more common in today's schoolrooms. Atari Learning System's new **AtariLab** educational software incorporating laboratory instruments is taking its place in junior high and high school science classes across the nation.

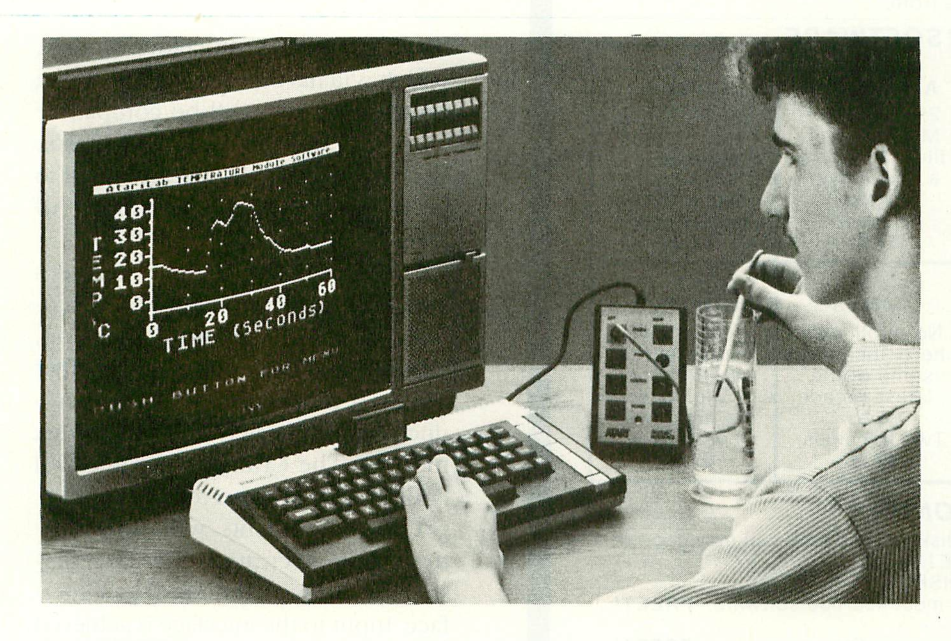
AtariLab developers Priscilla W. Laws, Ph.D. said "Young students are often uninterested in science because they're only asked to read about it. Rarely are they given an opportunity to perform experiments." Laws, Chairperson of the Physics and Astronomy Department at Dickenson College in Carlisle, Pennsylvania, believes that science can best be learned through doing.

INVITING EXPERIMENTS

AtariLab stations invite experimentation. They are easy to install, simple to use, and accept either joystick or keyboard input. Data sets are displayed on four-color graphs, and results can be seen quickly.

The AtariLab Starter Set ($89.95) helps students explore principles of temperature and heat energy. It contains a hand-held electric temperature sensor, a standard alcohol bulb thermometer, a 16K program cartridge (disk versions of the program cartridges are being produced for Apple and Commodore computer systems), a 144-page manual, and the AtariLab interface box which connects the sensor to Port 2. The interface box is used with every AtariLab module, but only comes with the Starter Set.

When running, the Temperature Module turns your Atari into a colorful recording thermometer capable of measuring temperatures between −5



and 45 degrees Celsius (23–113 degrees Fahrenheit). It records the temperature over time periods from 10 seconds to 24 hours. As temperature readings are taken, they are plotted on the screen in full color. Data also may be stored on disk or sent to a printer.

MORE MODULES COMING

Other modules currently under development include a light module which will allow experiments involving the measurement and absorption of light, a Crimelab module for experiments in forensic science, and a timekeeper module which provides general purpose timing functions. Atari Learning Systems plans to price these AtariLab modules at $49.95 each.

The Isaac Newton Junior High School, in Spanish Harlem, New York was one of the first schools asked to test AtariLab equipment in the classroom. The school received three Starter Sets in April 1984. Three of the school's 16 Atari computers were moved to the science lab. There, John Ferro, a computer science instructor, attached Starter Sets to the computers. Ferro and science teacher Vivien Fernandez used AtariLabs to teach several seventh and eighth grade "Introduction To Physical Science" lessons. "They're very simple to use, and the kids like them," Ferro said.

School director Leonard Bernstein feels the AtariLabs are "a good beginning point" for seventh and eighth grade science students. Bernstein said the three AtariLabs will become permanent fixtures in the school's classroom laboratory, and will be used "far more extensively" in the fall. If funds become available, Bernstein wishes to install four or five AtariLabs in each classroom laboratory, creating a 5:1 ratio of students to computers.

Though the first AtariLab instruction manual outlines more than 100 temperature and heat energy experiments, the AtariLab can be used in *any* similar experiment. AtariLab encourages students to create and conduct their own experiments. This feature was unexpectedly demonstrated during an April AtariLab preview at the Manhattan offices of Warner Communications, Atari's parent company. Ferro and five of his students pleasantly surprised Laws and the AtariLab development team by using the AtariLab Temperature Module to perform experiments which the development team had never considered. Ferro, for example, demonstrated a way to measure friction by rubbing the temperature sensor against different surfaces.

Naturally, AtariLab does have room for improvements. For example, although the manual briefly advises against using the computer near any liquids you're measuring, the Temperature Sensor's 30–inch cord makes this separation impossible. In busy classrooms, this could add a new and expensive meaning to the word "dump." Students also must avoid dipping the Temperature Sensor into any chemicals which might dissolve the sensor's plastic shell. Such chemicals include acetone, carbon tetrachloride, and gasoline.

Currently, the system can only measure and record information. Ferro suggested that the AtariLab take advantage of its potential to *control* experiments. For example, Ferro said the temperature sensor might be used with a thermostat program to control a fan. Ferro also said that disk-based AtariLab software would be superior to the cartridge-based software now being produced. Disk-based software would permit an experimenter to alter the AtariLab program to fit the needs of a particular experiment. Such software would allow the AtariLab user to conduct a greater variety of experiments.

Bernstein and Ferro also suggested that future instruction manuals be written in greater detail, and recommended that Atari sell Temperature Sensors capable of measuring higher temperatures.

BIOFEEDBACK & LIE DETECTORS

Atari plans to offer such a high-range temperature sensor, said Leslie Wolf, Product Manager for Atari Learning Systems. The sensor will be compatible with the original Temperature Module. Atari will also offer a disk-

continued on next page

based Advanced Temperature Module, which will have greater data-handling capabilities, and will be compatible with the new temperature sensor. Both products are now scheduled to be released during the summer of 1985.

Future $49.95 AtariLab modules will help students explore biofeedback, low-level nuclear radiation, robotics, and more than a dozen other topics. A new module is to be introduced approximately every four to six months. The Crimelab module will contain a "Lie Detector" program.

Creative students will surely try their hands at creating their own sensors for use with the AtariLab's interface. Input to the interface is achieved through four pairs of RCA phono jacks. Any device with an electrical resistance similar to that of your paddle controllers, for example, can be used with the first pair of ports. Electrical switches similar to paddle triggers and joysticks may be used with two other pairs, and the final pair of jacks tap the computer's +5 volt power supply.

A doctor at the University of Pennsylvania plans to replace $1,300 worth of analytical laboratory equipment with a $140 AtariLab station and an Atari 800XL computer. Dr. David Robinson, M.D., a staff member of the university's Department of Pharmacology, will use the AtariLab Light module to study X-rays of cell tissue. "I feel fairly sure the Atari will work as well as, or better, than our current system," Robinson said. Doctors in the pharmacology department have used Atari computers in the lab for nearly two years. (See "An Atari in Brain Research" in this issue.)

PLATO TEACHES

The best in interactive on-line learning

by MICHAEL CIRAOLO
Antic Staff Writer

There is one major source for Atari users who want on-line educational resources. The Plato Services Network can now be accessed with Atari's Learning Phone Cartridge ($49.95).

For $7.75 per hour of evening-weekend connect time, the first home computer access to Plato lets you choose from over 430 lessons—from preschool to the graduate level—in subjects from aviation to zoology. Unlike other information services, Plato's lessons deliver computer assisted instruction. The computer asks you questions, waits for the proper answer, corrects wrong responses, usually gives you several options and levels of instruction to choose from and almost always has Help available.

First-time users are confronted with a lengthy menu that includes options to program graphics, edit text, run Plato programs and check notes and electronic mail, among others.

Diana Ristenpart of Plato suggests that new users go to the electronic mail feature first, where they can participate in note files, which is what Plato calls its bulletin boards. There are special-interest files for Atari, microcomputers, Plato games, educators, and dozens of other areas.

"This is an excellent way to meet people and become familiar with the system," Ristenpart said.

When you are ready to sample Plato's educational offerings, there are several alternatives. You can go directly to the main menu option to Run Plato Programs, which will show you an alphabetical listing of subjects and files. If you know you are interested in biology, you can type it in and see the page of the index that includes all programs related to the biological sciences.

If you are interested in a particular program, you can simply type the file name after selecting "Run Plato Program."

ANTIC on PLATO

Welcome, Plato users, to "ANTIC Magazine on PLATO," a Plato notes file specifically for the readers of **Antic** magazine.

The file is easy to get to. From the main menu, select "electronic mail." Then select "read or write general notes." Plato will ask you "What file?" Type in "antic" and you will see the current list of notes. From there, use the HELP function to learn your way around the files.

This notes file is frequented by Atari users, **Antic** staff, Vincent Wu (creator of the Atari Plato cartridge) and various Plato regulars. It's *the* place to share ideas, get questions answered, make suggestions and comments about the magazine, and more. Drop us a line—and expect some *fast* feedback!

PLATO'S TOP TEN

If you are curious to know what others are sampling, and what the popular programs are, you can run a program called "Topten," a listing of the previous month's ten most used programs.

So far this year, two games (Moria and Empire) lead all programs used. The most popular category of education programs is "Elementary Math," followed by "English," "Computer Science," "Aviation," "Ages 4–7," "Biology," and "Astronomy." The on-screen menu will tell you what to press to see the actual file names instead of category headings, and you can discover what experienced Plato users already know.

One popular elementary math game is Darts, which teaches the concept of relative number sizes. A vertical line spans your screen, with various numbers at regular intervals—let's say the numbers 0, 1 and 2. Fastened to the left side of the line are a series of balloons shaped like clown's heads. Plato asks you to input a number with a decimal point, or a fraction, that will tell the computer where to fire a dart. For a balloon resting on the line near 1.3 you could fire a dart at 1.28 and prob-

continued on next page

ably hit the balloon. The game requires a perception of fractions or decimals, and teaches by allowing children to continue to shoot at balloons until they succeed.

"All kids have trouble at some point with math," said Plato Learning Phone manager Nancy Vernon. "These programs are fun to look at and have good graphics."

When young children outgrow Darts, they can move on to a host of other instructional math games. Games give way to straightforward programs that teach subjects as advanced as calculus, differential equations and Fourier transforms.

Unlike other on-line services, Plato offers pictures and graphics, Vernon said. "People like graphics. They like to see things move."

This graphics potential is used not only for young children, but for drawings and diagrams in more advanced lessons, in the same way a high school or college instructor might draw something on the blackboard.

GRAMMAR AND FLYING

When adults get tired of playing Plato's games (which many consider to be some of the best computer games available), they turn to the education programs, particularly English and computer science curricula. The most popular English programs give you access to nearly 100 word and usage lessons.

"I think most adults are brushing up on their grammar and English usage," said Vernon. Older students are also fond of Plato's planetarium and flight simulators.

For some teachers, Plato's games offer unique tools of instruction. For example, the multiplayer, interactive dungeon game Moria is used in several classrooms nationwide to teach strategy and offbeat problem solving.

Other on-line databases, including the Bibliographic Reference Service, DIALOG, CompuServe and the Source, have indices and references for educators, but otherwise provide only marginal educational services. CompuServe, for example, provides a news service for educators, a database to help deaf people move into mainstream society, bulletin boards for disabled users and educators to share information and experience, a guide to colleges and financial aid from the College Board, and a few word-search indices for education-related topics. The Source and CompuServe also have a few sundry question-and-answer programs that could be called "educational" but are more like trivia games.

DIALOG, the Bibliographic Reference Service (BRS) and its sibling BRS After Dark offer a wide variety of databases that may be of help to educators. Like CompuServe, these information services include word search indices, references to colleges and high schools, and specialized information on topics such as the disabled, technical and vocational education. However, none of these services offer computer assisted instruction. For more general information regarding on-line databases, please see "Antic Pix Online Services" in the July, 1984 **Antic**. In the same issue you will find an introduction to Plato entitled "Plato Rising."

PLATO'S TOP CLASSES: A SAMPLE

Education made exciting

by MICHAEL CIRAOLO
Antic Staff Writer

This is the beginning of the Zeiss Planetarium, one of Plato's more popular learning programs. Filenamed 0Zeiss, this model planetarium displays star maps and other celestial information for the northern skies at any hour of any year from 950 A.D. to 2950 A.D.

After Plato has loaded the program, you are presented with a menu, which includes an introduction, a catalog of 500 celestial objects available, star charts and a model planetarium—which fills an 8-inch by 5-inch oval window on your screen with graphics of stars, nebulae, galaxies and planets.

Plato's Planetarium has more information than is easily viewed on a standard monitor. This is an opportunity for you to use the joystick: the button will zoom in your view of the screen, and the joystick moves the close-up window around.

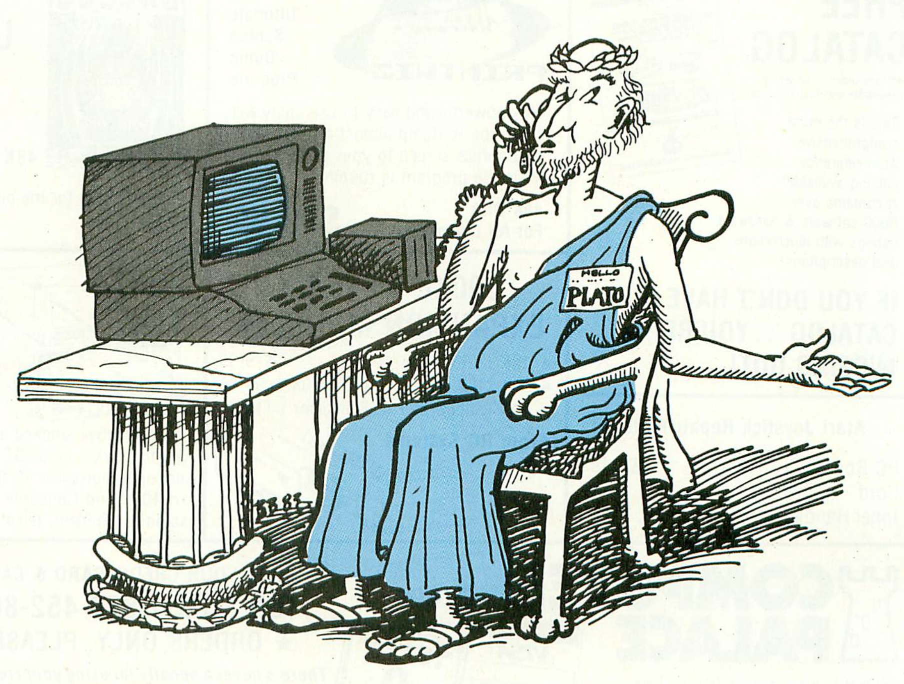
The Zeiss planetarium gives you a library of astronomical information at your fingertips and adds a new dimension to star gazing.

Parents and younger Plato users will find 0bees an excellent beginning math game to teach subtraction. You are presented with a beehive, which you fill with two to nine bees. You let bees in and out of the hive as Plato asks you how many are left inside. The catch: you can't see inside the hive unless you use "X-ray" device to peek in and help yourself.

One of Plato's vocabulary drills, 0voc0, teaches Latin roots and English vocabulary. The computer congratulates you for correct answers and won't let you proceed until you make the right choice. Help is always available, and you can flip back to prior pages of notes and information.

More advanced technical lessons, 0digestion and 0osmosis, use animation, detailed graphics and text. Diagrams illustrate the duodenum or a semipermeable membrane. You can choose introductory lessons, experiments or quizzes from the menu.

Plato's most popular computer science lesson is called 0roboint, an introduction to the Robocar programming language devised for teaching introductory computer programming. Designed for newcomers to programming, Robocar teaches simple commands which will move a robot car around a city. With the car, you see the immediate results of your programming while learning the fundamental principles of programming. 



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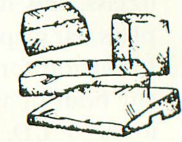
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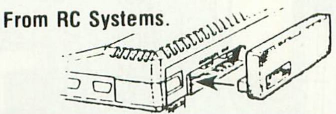
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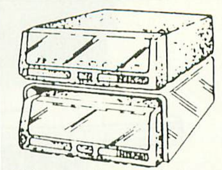
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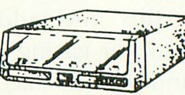


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SOLVING PUZZLES WITH LOGO

Probability calculations made easy

by ERRIC SOLOMON with CHARLES JACKSON

Short puzzle-solving routines in Logo that demonstrate this language's logical analysis power. The program runs on all Atari computers, and requires the Atari Logo cartridge. Antic Disk subscribers, LOAD "D:BIRTHDAY.LGO then follow the instructions in the article.

If 25 people are in a room the chance is 56.78% that at least two of them have the same birthday.

Puzzles like this are ideal exercises for the Logo programmer.

When solving a brain-twister with a computer, you should try to see it from at least three different perspectives. Look at the word puzzle as a problem in logic, then as a problem in math, and finally as a programming problem.

To define your word puzzle in logical terms, it's helpful to match all the information you know against the added information you will need for solving the problem. Use any patterns, trends or relationships you can discover to create an *algorithm* for the word problem. An algorithm is a logical set of steps you must take to solve a problem.

Use your algorithm to design a set of equations which will define your word puzzle mathematically. Finally, translate these equations into Logo procedures which your Atari can execute.

We'll use the Birthday Puzzle and Logo to illustrate each of these steps.

THE ALGORITHM

We know there are 25 people in the room, and that there are 365 days in a year (leap days are ignored). Since it is likely that a small group of people will have a wide range of birthdays, we'll first calculate the chances of at least two people having different birthdays. We'll subtract this result from one to find the probability of at least two people having the same birthday.

THE MATH

Next we'll break the problem down into smaller pieces, and define each piece with an equation.

Consider a room with one person standing in it. We are certain that nobody else in the room shares this person's birthday—nobody else is there. The birthday could occur on any one of the 365 days in the year. Mathematically, this probability can be represented by 365/365.

Now consider a room with only two people standing in it. The first person's birthday occurs on one of the 365 days in the year. If the second person's birthday is to be different, it can only occur on one of the 364 remaining days. In other words, the chances of two people having different birthdays is 364 out of 365. We can numerically represent this as 364/365 × 365/365.

If a third person's birthday is to be different from the rest, it can only occur on one of the remaining 363 days. The probability of the third person's birthday being different from both the first person's birthday *and* the second person's birthday is represented by 363/365 × 364/365 × 365/365.

When a fourth person enters the room, only 362 "unclaimed" days remain. Our probability becomes: 362/365 × 363/365 × 364/365 × 365/365.

continued on next page

This can be abbreviated as:

$$\frac{(365!/361!)}{365^4}$$

And we can make a general equation for N people as folows:

$$\frac{\frac{365!}{(365-(N-1))!}}{365^{(N-1)}}$$

Again, this equation calculates the chances of at least two people having different birthdays in a room of N people. Subtract this value from one to determine the chances of two people having the *same* birthday in a room of N people. So our final equation becomes:

$$1 - \frac{\frac{365!}{(365-(N-1))!}}{365^{(N-1)}}$$

THE LOGO PROGRAM

We'll write three short routines to solve the Birthday Problem: an input procedure, an initializing procedure, and a procedure which solves probability equations. We'll call our procedures BIRTHDAY.PROBLEM, BEGIN.SOLVING and SOLVE.

To use the procedures, type in the listing at the end of this article with the Logo cartridge. Call the BIRTHDAY.PROBLEM procedure by typing the name of the procedure, followed by the arguments (numbers) required by the procedure. For instance, type BIRTHDAY.PROBLEM 25 to determine the likelihood of any two of 25 people in a room having the same birthday.

To use PROBLEM.SOLVING, you must type PR (or PRINT) before the name of the procedure, and follow the name with two numbers. See the examples at the end of this article.

The first procedure, BIRTHDAY.PROBLEM, accepts the variable PEOPLE, which represents the number of people in the room. Then, BIRTHDAY.PROBLEM calls the BEGIN.SOLVING procedure and tells it the value of PEOPLE along with the number 365, the number of days in the year.

BEGIN.SOLVING accepts these two values, and assigns them to the local variables EVENTS and POSSIBILITIES. The value once stored in PEOPLE is now contained in EVENTS. And POSSIBILITIES contains the number 365.

Then, BEGIN.SOLVING initializes the global variable PROBABILITY to one, and decreases the value of EVENTS by one. Finally, BEGIN.SOLVING calls the SOLVE procedure and tells it the values of EVENTS and POSSIBILITIES.

SOLVE uses these two values to solve our probability equations. Since Logo doesn't have a factorial function, the SOLVE routine must be used over and over again until it arrives at an answer. For example, after our first trip through SOLVE, the value of PROBABILITY is 341/365. After the second trip, the value becomes 341/365 × 342/365, and after the third, the value becomes 341/365 × 342/365 × 343/365.

RECURSION

Just as a procedure can call another procedure—it can call itself. This call forces the procedure to run itself over and over again, until another instruction tells it to stop. The process of a procedure calling itself over and over again is called "recursion." SOLVE is a recursive procedure, and calls itself in the fifth line.

SOLVE keeps calling itself until the value of EVENTS is zero. When this happens, the value of (POSSIBILITIES −EVENTS)/POSSIBILITIES is equal to one, and our modified factorial routine is complete. The result is subtracted from one, and printed on the screen.

BEGIN.SOLVING and SOLVE may be used with many other probability calculations, such as these two dice puzzles:

1. If you threw three dice, what are the odds that at least two would match?

How to Solve:
We know that a die has six sides, and we have three dice. We'll use our BEGIN.SOLVING procedure, and type:

```
PR BEGIN.SOLVING 3 6
```

2. Suppose a twelve-sided die has a different number on each face. If you threw four of these dice, what are the odds that at least two would match?

How to Solve:
Each die has twelve sides, and we have four of these dice. Using BEGIN.SOLVING, we'd type:

```
PR BEGIN.SOLVING 4 12
```

Take the time to thoroughly examine your word puzzle before writing a Logo program to solve it. Remember that there are many routes you can take to arrive at a correct answer. Selecting the most direct route is a key to efficient programming.

ANSWERS

If you don't have an Atari Logo cartridge but have worked up a curiosity about these puzzles anyway, here are the answers . . .

Three-dice problem: 44.44%
Four-dice problem: 42.71%

Erric Solomon started programming with Logo at the age of 8. His aunt was on the MIT team that developed the Logo language and he was one of their earliest "guinea pigs." Currently he's the California consultant for Montreal-based Logo Computers Systems Inc., which produced Atari Logo and other microcomputer Logo translations.

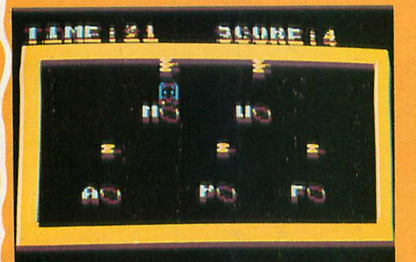
listing continued on page 53



MOLE ATTACK

by MASAHIRO MORI

A way for young beginning typists to practice finding letters while having fun. The BASIC program runs on all Atari computers and of all memory configurations. Antic Disk subscribers RUN"D:MOLE. BAS".



The moles are attacking! Get ready to type! This educational program, designed for 'one-finger-wizards,' lets you practice touch typing random letters while vanquishing the enemy moles. Best-selling commercial programs like **Type Attack** and **Master Type** can provide more advanced drillwork.

Type in the program, check it with TYPO, and save an extra copy on disk or cassette. Now RUN it.

First you'll see the title screen, followed by a flashing screen as the program loads. When the program is ready to start, it will play a snatch of "Oh Susannah," then ask you what level to play at. Type in a number from 1 (hardest) to 10 (easiest), then press [RETURN]. Next, enter the game length in seconds, and press [RETURN] again. The first time you play, try 20 seconds. Finally, you'll see five letters, which are chosen at random for each new game (for instance, G,Z,I,P,K), on the screen. Type each letter in order to begin the game.

The game's object is simply to hit the mole on the head with a hammer every time he pops up near a letter. Do this by pressing the corresponding letter key as soon as you see a mole. For each successful hit, you receive one point. The higher the difficulty, the harder the mole is to catch. When your time is up, you'll receive a progress report and get an opportunity to try again.

*Masahiro Mori, one of **Antic**'s youngest regular contributors, is 14 years old and attends Morrison Christian Academy in Taiwan. He is particularly interested in programming Atari Player/Missile Graphics and redefined character sets.*

listing continued on page 53

PLUS MINUS

by WALTER BULAWA, Ph.D & CAROL BULAWA

A simple arithmetic program for young children. The BASIC program runs on all Atari computers of any memory configuration. Antic Disk Subscribers RUN "D:PLSMINUS.BAS".

In teaching elementary arithmetic to children, a technique almost universally used is to give physical examples incorporating things that the child can relate to. A teacher might say "If Andrew had four blocks and Jennifer gave him two blocks, then how many blocks would he have?". In mentally solving the problem, Andrew would probably visualize a group of four blocks, count them and continue counting through another imaginary group of two more blocks to arrive at the answer.

The program Plus Minus was written to provide a child who has recently been introduced to addition and subtraction with a learning aid using this form of visual support. No number value presented will be less than zero or greater than fourteen.

INSTRUCTIONS

After you type in listing 1, use TYPO to find any typing errors and SAVE a backup copy.

Type RUN. The program will ask you to add or subtract a pair of numbers on the screen. Type in your answer. You need not press [RETURN]. If you have answered the problem correctly, the computer will print "CORRECT" and give you another equation. If you answer an equation incorrectly, try again. The computer will not move to the next problem until you've correctly answered the current one.

Walter and Carol Bulawa are married and have two children. They have owned their Atari since early 1983 and wrote Plus Minus to help their five-year-old son learn arithmetic.

listing continued on page 56

TAKE-APART

100– 180	Randomly selects the uppermost value (A) and then randomly selects the answer (C). The remaining value (B) is computed as the difference between A and C in order to avoid negative numbers in the answer. The variable S is the index of the sign (arithmetic operation) in the sign character string SIGN$.
192– 194	Strings are used to display the problem values so that they may be properly placed on the screen.
208– 210	Selects the character from the string CHNEW$ that is to be used as the display object. Although there are eleven objects, each is represented in CHNEW$ in its four forms (upper-case, upper-case inverse, lower-case, lower-case inverse) so that the object may appear in different colors at different times.
220– 280	Erases the previous problem, displays the values that comprise the current problem and displays the corresponding number of objects to the right of each value.
310– 332	Accepts on character input from the keyboard.
338– 350	Determines whether the input character matches a remaining character in the answer string.
352– 356	If the input character does not match a character in the answer string then output a descending tone and await further input.
359– 370	If the input character matches a remaining character in the answer string, display the character in its proper position in the problem, put a blank in the copy of the answer string so that the same input character won't trigger another correct response, and finally, if not all the answer characters have been entered go back for input.
400– 470	Slide the number of objects, equal to the value of the answer, in from the right.
480– 490	Pause. Erase CORRECT and present a new problem.
8000– 8999	Display title page, play music, and await press of START.
9000– 9099	Set the graphics mode and poke the location of the new character set.
10000–10200	Redefine selected characters of a new character set. The first two data statements define the two characters that are used to form the line above and answer and the line separating the problem from the objects. The next eleven data statements define the objects to display. The last fourteen data statements define the numbers 1 through 14 as custom characters, each number being displayed within a single character.

Bit by bit, Star's Gemini-10X printer will grow with you.

"Having a quickly growing marketing business means more and more paperwork. And the way I type, I knew early on that I needed a printer.

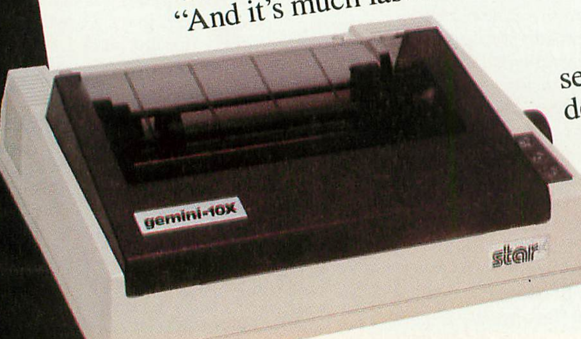
"I chose the Gemini-10X dot matrix printer because I wanted a printer that could do it all.

"First, the Gemini type is excellent. Actually good enough for letters. And I can also create my own type. For example, I designed "SteveScript." It's a combination of two different type styles and it makes my letters really stand out.

"Plus, my Gemini can do all sorts of advanced graphics, which a daisywheel can't.

"And it's much faster. No more time wasted typing. It was a pleasure to throw the whiteout away."

Steven Clarke—San Francisco, California



With Star's Gemini-10X printer you get 120 characters per second of clean, crisp type, multi-function versatility and steady, dependable service. All at a price that works.

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You bought an Atari . . . with the taxpayer's money?! exclaimed the electronics technician at my university. You should be arrested!"

"Er, I gather then you won't assist me in interfacing the Atari to my laboratory equipment."

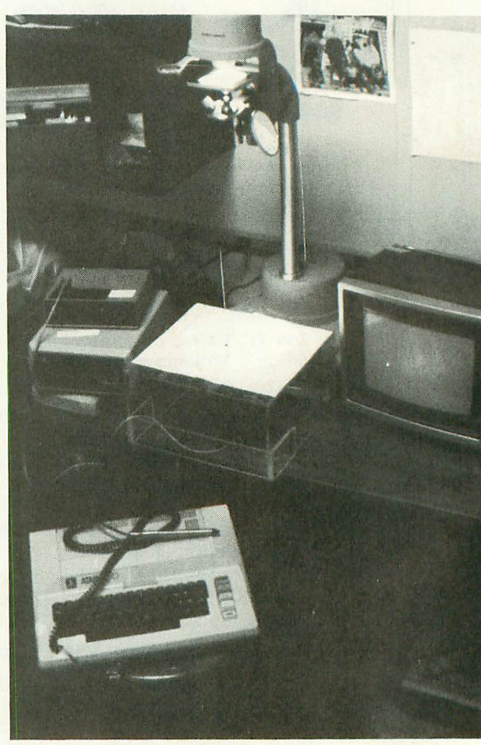
He started to laugh. "Here at the university electronics shop, we don't work on *toys*."

A *toy!* How could anyone call an Atari 800 a toy? Granted that it played great games. But a common lab micro, such as the Apple II, had only one microprocessor, the 6502. An Atari had four microprocessors, the 6502, ANTIC, GTIA and POKEY. The ANTIC co-processor gave the Atari incredible graphics abilities—display lists, color palettes, single-bit scrolling—things the Apple simply couldn't do. Plus the Atari was cheaper than an Apple. An Atari with a disk-drive and printer would cost me roughly $1000, while an Apple with the same peripherals would easily cost twice as much. In an era of declining Federal support, you had to be a penny-pincher.

BRAIN MAPPING

I wanted to use the Atari as a computerized light meter. My research involves making chemical pictures of the brain by a technique called *autoradiography*. Thin slices of a rat brain or human brain are exposed to a radioactive drug or hormone. The drug or hormone then attaches itself to protein molecules on the outside of brain cells called *receptors*. By placing the brain-slice against a special photographic film that responds to radioactivity, it's possible to take a picture of where a receptor is in the brain.

The Atari would tell me how dark or light portions of the autoradiogram were. The higher the optical density of a brain region, the more receptor there was, so I would essentially learn



Dr. Rainbow's workstation. The photocell, connected to the Atari, is under the illuminated brain autoradiogram, the bright circle in the center.

BRAIN RESEARCH WITH THE ATARI

Mapping brain receptors at medical school

by TOM RAINBOW, Ph.D.

from the Atari the biochemical concentration of receptor within that brain area. The simplest way to do this was to interface a photocell with the Atari. I would project a light through the autoradiogram and move its image over a stationary photocell. The less light transmitted to the photocell, the more receptor was in that brain region.

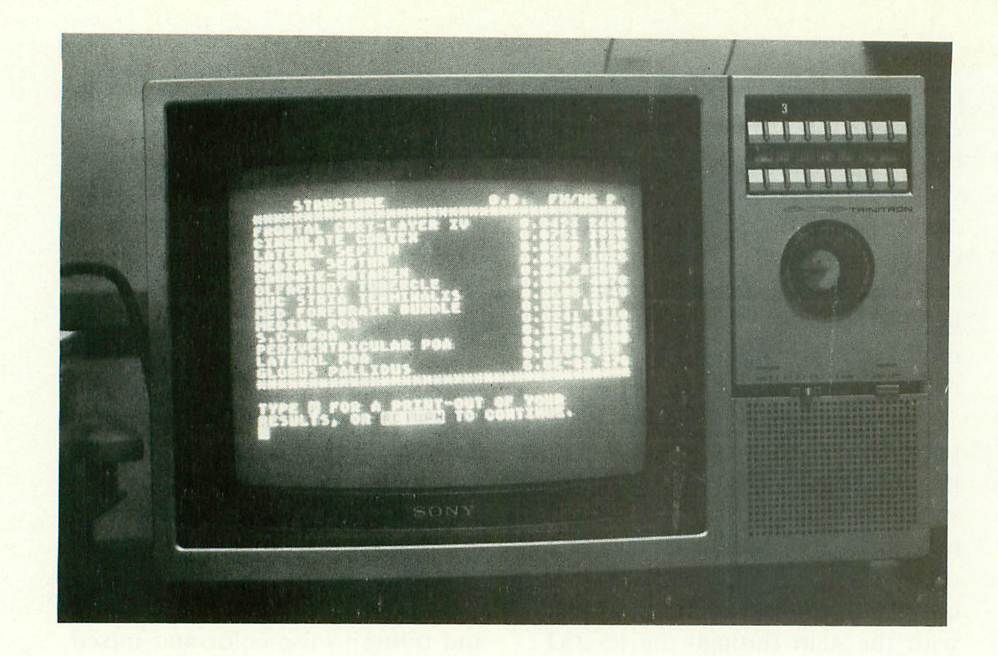
Originally, I had in mind connecting a photocell through the PIA joystick ports. This got nixed by the supportive, enthusiastic reaction of my campus electronics shop. So I opted for a commercial analog-to-digital converter that could connect with the Atari through the RS-232 serial port on the 850 interface. The one I bought was the EI-100 unit from Cambridge Development Laboratories, Watertown, Mass. This unit was nice in that you could purchase a plug-in photocell for it, and most significantly, Cambridge Development Labs had actually prepared a separate manual for the Atari 800, complete with sample programs written in Atari BASIC.

With the sample listings, it was a cinch to write a program that would open the RS-232 port and take light-readings from the photocell. There are several other sensors available from Cambridge Development Laboratories, so you could also use the Atari to take pressure or temperature readings, for instance.

We got cute with our program, choosing a light pen for user input, and trying to use color and mixed display-list modes as much as possible. Essentially, the program is designed to let the user set up "laundry lists" of brain structures. The Latinized medical name of the brain structure is displayed on the top line of the TV screen in Graphics 0. Below, in Graphics 1, is the current photocell reading, represented as a number from 0–255. When the user wants to take a reading, he touches the "Keep Value" spot with the light pen. The program will then average subsequent readings until the user touches the "Exit" spot.

The name of the next brain structure in the laundry list is then displayed for analysis, and so on, until the optical densities of all the structures on the original list have been measured. The program then does some algebra to convert the density values into the actual concentration of receptor in a brain region. The laundry list of structures with the

continued on next page



A "laundry list" of brain structures forms a menu from which researchers can select areas for more extensive computer processing.

associated receptor concentrations is then displayed in Graphics 0 and dumped to an Atari 825 printer.

LAUNDRY LISTS

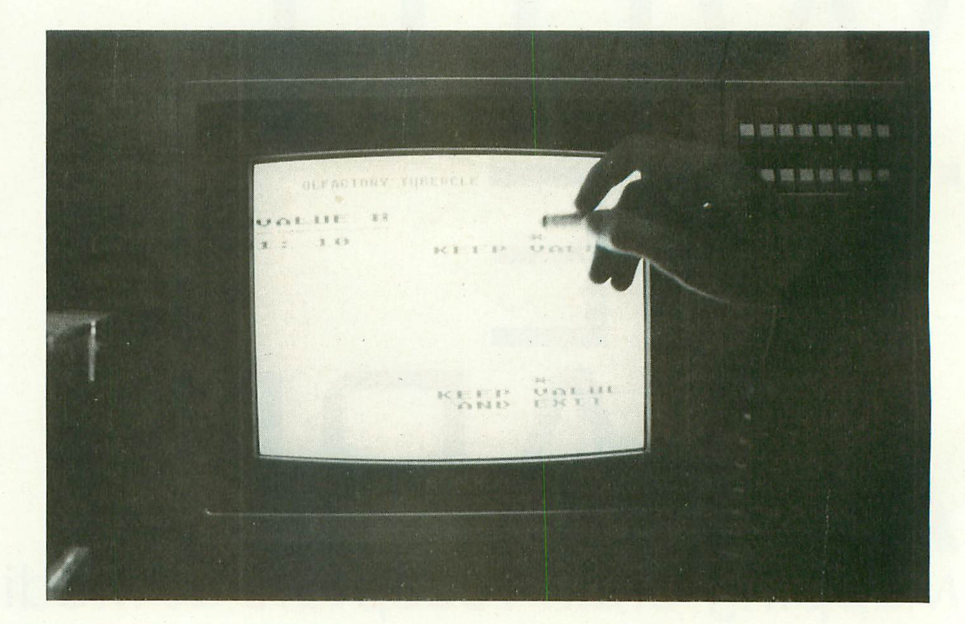
The program is long, occupying essentially all the available RAM on a 48K Atari 800. It is messy to write such long programs in Atari BASIC, with its lack of Trace features and whatnot. The available enhancement software that improves the editing features of Atari BASIC takes up too much memory to use with our program. If we had to do it all over again, we would probably write the program in some version of C Language that supports floating-point on the Atari. We could have then used a real text-editor and compiled the program. However, Atari BASIC was really the best choice when we wrote the thing, and it wouldn't be such a bad choice even now.

I would like to think that I may make some significant scientific discoveries with my Atari. We've published about 20 research papers so far where we've used the Atari to analyze brain autoradiograms. None of these studies has yet won me a Nobel Prize or cured a Dread Disease, but maybe they are making some incremental contribution to our knowledge about how the brain works, and certainly, they would have been done much less well without the Atari.

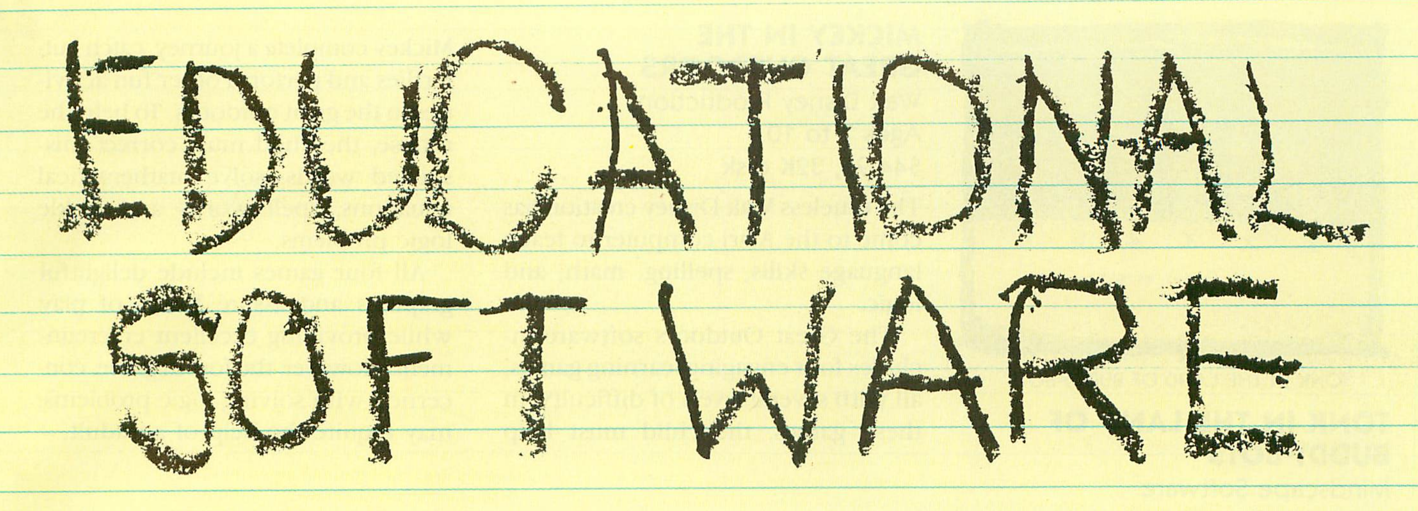
The other important use for our Atari is as a low-cost word processor. All of those 20 research articles plus about $200,000 worth of research grant proposals were written on an Atari. We are big fans of the Letter Perfect word-processor by LJK, which works nicely with our 18 characters-per-second el-cheapo Comrex CR-1 daisy-wheel printer. With Letter Perfect, we can make the Comrex underline, superscript, subscript, and do a one-word boldface—all the printer functions you need to publish a scientific paper—and done with a $70 word-processor and an under-$500 daisy-wheel. We currently have two Atari 800's in the lab, one is our "home-made" densitometer which doubles as a word-processor and the other basically just functions as a word-processor.

I suppose that like many **Antic** readers, I get frustrated when the rest of the world doesn't recognize the superiority of my computer. However, I use my Atari for scientific research, a very serious purpose, and I like it. It's truly a very serious computer. And you know what else? It plays *great* games!

Tom Rainbow, Ph.D. is an Associate Professor of Pharmacology at the University of Pennsylvania School of Medicine.



Using the light pen to tell the Atari what readings to take.



Antic's Top 18 Picks

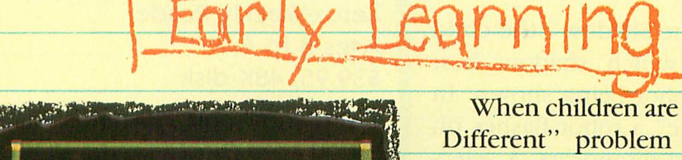
by ANITA MALNIG **Antic** Contributing Editor

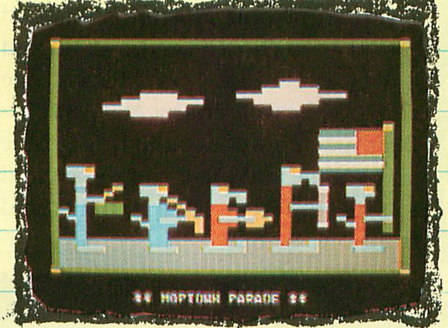
Right now you can choose from over 100 educational products for your Atari. Many software publishers believe that educational programs are the next big growth area in the home computer market and they are rushing out new packages as fast as they can.

Some of these programs are superb, but others are frankly not so hot. The mass of products crowding the shelves is confusing for parents who are searching for the educational software that best meets their children's needs.

That's where this **Antic** round-up comes in. We tried to look at every piece of educational software currently released for the Atari computer. The 18 best products we found are described here, arranged for you by subject. We tested these products on **Antic**'s line-up of Atari computer models and made the reviews using an 800XL.

We also include a chart of 25 runner-up educational programs that might meet some of your children's needs. And at the end of this article you'll find the addresses and phone numbers of every publisher whose software made these pick lists.





MOPTOWN PARADE

MOPTOWN PARADE
The Learning Company
Ages 6 to 10
$39.95, 48K disk

What can you learn by knowing the difference between a Bibbit and a Gribbit? Find out by playing Moptown Parade, a collection of seven learning games for children aged 6 to 10, probably best suited in style to the younger end of the spectrum.

The games progress in difficulty from the easiest "Make My Twin" to "Clubhouse." The skills taught include matching, pattern analysis and problem-solving strategies. Children are invited into a story and asked to get to know the characters. Bibbits have big feet, Gribbits have tails, some are short, some are tall.

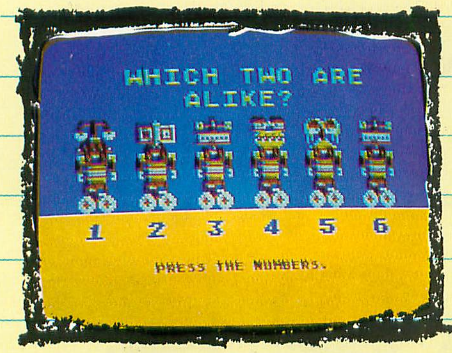
When children are given a "What's Different" problem they must not only state which character is different but also what characteristic distinguishes the differing creature. When playing "Parade," children must figure out the pattern in which the characters appear and insert the next creature according to that pattern. Clear crisp graphics will appeal to children and the lesson-games have been well thought-out.

MOPTOWN HOTEL
Ages 8 to 13
$39.95, 48K disk

Moptown Hotel follows Moptown Parade in this series. The child still plays with the same Moptown Bibbits and Gribbits but at an increased skill level. The games feature more advanced concepts of logic—making analogies, formulating and testing hypotheses.

For instance, you have to guess the four attributes of "your secret pal." You find out that two of the four characteristics you guessed are correct but you don't know which 2. So you must invent a strategy to guess the secret pal in 4 tries or less.

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TONK IN THE LAND OF BUDDY-BOTS

TONK IN THE LAND OF BUDDY-BOTS

Mindscape Software
Ages 4 to 8
$39.95, 48K disk

For years Mercer Mayer has been delighting children with his funny little monsters and now he's brought that childlike appeal to these odd shaped, bright green, orange and white robots.

In "Match the Shadow" the child must decide which shadow best matches the robot being shown. In "Remember Me" a robot flashes on the screen then disappears. A selection of robot parts then appears. Did it have a round head or a square one? Did it have big red feet with bowed legs?

There are six games, each with four levels of play, ensuring a fairly long game span time. The easiest game is "Different/Alike" and the most challenging is "Mini-Bot Factory" in which you must grab robot pieces off an assembly line in the right order to build your robot.

The animated robots and the accompanying music will draw the whole family to the computer screen. As I viewed an early prototype of the program, no documentation was yet available.



MICKEY IN THE GREAT OUTDOORS

MICKEY IN THE GREAT OUTDOORS

Walt Disney Productions
Ages 7 to 10
$44.95, 32K disk

The timeless Walt Disney creation has come to the Atari computer to teach language skills, spelling, math, and logic.

The Great Outdoors software includes four engaging learning games, all with several levels of difficulty. In these games, the child must help Mickey complete a journey, catch butterflies and perform other fun activities in the great outdoors. To help the mouse, the child must correct misspelled words, solve mathematical equations, spell words and tackle logic problems.

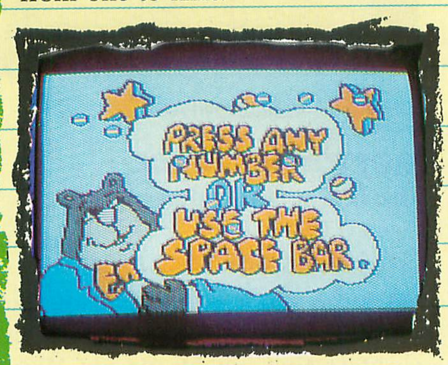
All four games include delightful graphics and assure hours of play while providing excellent entertainment. However, the fourth game, concerned with solving logic problems, may require the help of an adult.

Early Math

STICKYBEAR NUMBERS

Xerox-Weekly Reader
Ages 3 to 6
$39.95, 48K disk

Children's book illustrator Richard Hefter co-authored this program and his bold, amusing graphics come across very well on the Atari. StickyBear greets us dressed in bright blue and orange and then shows the child lots of different objects numbered from one to nine.



STICKYBEAR NUMBERS

Pressing a number key gives a display for that number: two geese, five hats, eight rockets. The objects displayed for each number change whenever you run the program. Hitting the space bar subtracts or adds a particular object. The geese fly, the trains chug, the penguins flap and waddle. Kids will love the animation.

You also get a StickyBear counting book as well as a poster and stickers. Hopefully, these supplements will increase the longevity of play time. Other programs in the series are the games StickyBear Basket Bounce and StickyBop. Upcoming for the Atari are StickyBear Opposites, Shapes, and ABC.

TEASERS BY TOBBS

Sunburst Communications
Ages 8 to Adult
$39.95, 32K disk

This charming program stars Tobbs—a little guy who lets you know if you've figured out the arithmetic answer properly. And, to figure out those answers you've also go to do some logical thinking.

There's a grid with several numbers along the top and down one side. The correct answer must be placed in a specific square within the grid. The introduction very clearly explains how you decide where each answer belongs. Not only does this program offer an arithmetic drill and practice, it encourages the child to think about logical patterns.

As the program progresses the child must figure out increasingly complex patterns. The problem becomes, "What must I add to 5 in order to get an answer in the right square?" Sometimes it seems impossible to figure out which is the next correct square. But all necessary clues are right there and the child begins to

Logic

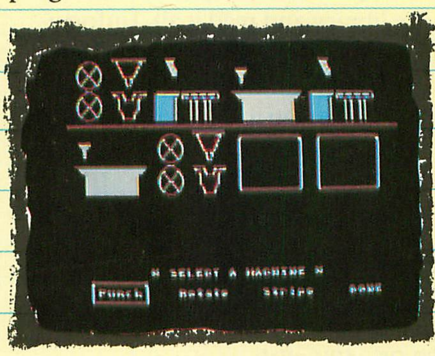
THE POND

Sunburst Communications
Ages 2nd Grade to Adult
$39.00, 32K disk

Users look for a series of jumps that will move a frog across a series of lily pads to the final magic lily pad. The route is typed in and then the frog takes off on its own. A child playing this game must plan logically and gains practice in recognizing abstract patterns.

Sequences progress from a simple two-pattern route to a four-pattern route with distractions. The child is challenged on a variety of levels. Further, the child uses experimentation to form a hypothesis and also recognizes that there may be more than one solution for a problem. I expect younger children will want to try to play and older children may find the frog concept a bit young.

Visually, The Pond is filled with shades of green, yellow, and a bright pink magic lily pad. The documentation for the teachers' edition explains the game's educational potential in depth and offers supplemental activities. Home documentation is written more to the young user and offers extra projects to extend use of the program.



THE FACTORY

THE FACTORY

Sunburst Communications
Ages 7 to Adult
$39.00, 16K disk

Here Sunburst offers older children a more advanced level of the same logical building skills taught in The Pond. The factory's machines punch, make stripes and rotate. With those devices children design and produce their own products or duplicate existing products. Each product is a square object with a variety of holes and shapes on it.

Children gain practice in spatial perception, logic and pattern recognition as the machines grind, whir, and move up, down and around. The program encourages children to repair and salvge an incorrect product. It'll be no hardship at all for parents to spend time with their kids on this package.

SNOOPER TROOPS

Spinnaker
Ages 10 to Adult
$44.95, 48K disk

In Snooper Troops you use deductive reasoning to find out who's scaring the Kim family out of their home! The screen format is mostly text—you've got to answer questions and piece together information that comes in from a wrist radio and from SnoopNet Computer files on the suspects. You also move the detective inside the supposedly haunted house.

Children's solve-it yourself mystery books have been big hits for quite some time and this is a computer version. The accompanying book gives additional facts about all the characters and is fun to read.

AGENT U.S.A.

Scholastic Inc.
Ages 9 and Up
$29.95, 48K disk

This program also exercises skills of deductive reasoning—by encouraging Agent USA to investigate the Fuzzbomb that's on the loose, turning helpless citizens into Fuzzbodies! Agent USA travels all over the country by train, consulting maps and train schedules. It's a painless way for a young person to learn basic geography and time-table reading.

The whole program is an ongoing story in which the child must become involved in order to play successfully. The documentation includes a map of the United States and memos from Agent USA's director with leads to follow, dangers to avoid and top secret info on how to disarm the Fuzzbomb. The upbeat music, clanking of trains and little folks with feet sticking out from ten-gallon hats keep the action moving.

continued on next page

discover them.

Addition, subtraction, multiplication and division all have four levels of increasing difficulty so there's no quick run through the program. Tobbs first challenges you and then rewards you with a delightful nod when you get the correct answer. This is an innovative and encouraging way to practice arithmetic.

BUMBLE GAMES

The Learning Company
Ages 4 to 10
$39.95, 48K disk

Bumble, a furry creature from the planet Furrin, helps children locate and plot points on lines and grids. The six games grown increasingly difficult starting with "Find Your Number" which offers practice in choosing whether a number is more or less than another number.

In "Butterfly Hunt" the child must locate a butterfly in a 5×5 array of boxes. The program prompts children to go to the left and up, the right and down, and so on, until they find the box hiding the fluttering butterfly. Lovely color, sound and animation make the learning process lively.

The user progresses to a Tic Tac Toe game. In the final game, "Bumble Dots," children actually draw pictures by plotting dots. This is a well-thought out learning package.

Language Skills

HEY DIDDLE DIDDLE
Spinnaker Software Corp.
Ages 3 to 10
$29.95, 32K disk

This is truly an electronic-age nursery rhyme book. The first section of the program, "Storytime," displays the opening verse of a poem followed by a picture illustrating it. Then, the next verse appears and a lively tune plays. Parent participation is helpful. It's unlikely that children who appreciate nursery rhymes will be able to read.

The second section, "Storybook," displays more sweet, funny verses and colorful pictures as the music adds a dimension that hand-held storybooks don't have.

The last section, "Rhyme Game," might bring a 10-year-old into the computer room. It's a poem with all the lines out of order. You must race a clock to move the lines into proper order. This game/exercise is fun for adults as well as children and gives a good introduction into the structure of verse. Documentation is adequate for understanding what to do but doesn't offer any additional activities or exercises.



HEY DIDDLE DIDDLE

M-SS-NG L-NKS
Sunburst Communications
Ages 9 to Adult
$39.00, 48K disk

C-n y-- r--d th-s s-nt-nc-? Reading sentences like this is what M-ss-ng L-nks is all about. It's an ingenious way to get to know some classic works of children's literature and to begin understanding the structure of words, sentences, and paragraphs. And it's a lot of fun.

There are nine formats to choose from ranging from the easiest—omission of vowels—to the hardest—blank spaces! But if you progress through each step, knowing the work by heart at the end won't be too difficult. The software authors choose passages from excellent books: *The Wind in the Willows, The Cricket in Times Square,* and *Charlie and the Chocolate Factory*, among others. It's more than likely that when you're done playing this game with your children you can get them to take the book out of the library and read it all. Unfortunately, the home version of the program does not have an editor which would allow you to add other stories. Note: We needed a translator disk to make this work on our XL.

SPELLDIVER
Scholastic, Inc.
Ages 6 and Up
$29.95, 48K disk

Bright graphics and bouncy music introduce this active spelling game. The trick is to get your deep sea diver to remove the lettermoss from large letters—only part of the letter shows up on the screen at one time—and guess what the hidden word is.

This diver must avoid pesky fish that nibble at his toes and larger sharks that cruise by. There are three levels of game play: in the first you figure out words that are coordinated with a story in the accompanying documentation. In the second you can choose the length of the word you want to find. The program gives you over 2,000 words to choose from. The last is a "do it yourself" which allows you to choose your own words. Lots of activity here, excellent graphics and music.

The following games were not designed or marketed for their educational value. But although they are primarily entertainment products they have built-in learning factors—as well as representing state-of-the-art software . . .

Construction & Strategy Games

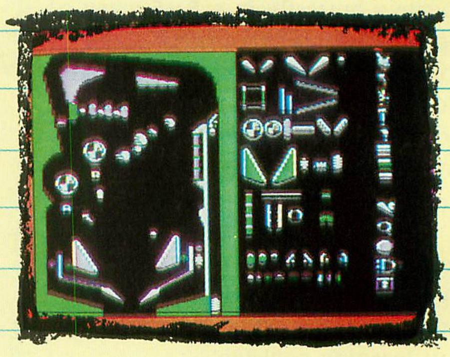
PINBALL CONSTRUCTION SET
Electronic Arts
$40.00, 48K disk

Already a classic of software that fosters creative thinking, this program invites you to design your own pinball game. Everything you'll need is beautifully laid out next to the blank pinball table in the form of icons (pictures).

With the joystick you move a pointing hand to a particular picture to drag chosen objects onto the pinball table. You change colors, place the bumpers, slingshots and flippers where you want them. Play by the real-world rules of physics or modify gravity to your own wishes.

Games like this use the computer's interactive capabilities to a high degree. The player is the creator. Striking colors ranging from deep blue and purple to amber add drama to the creating and game playing. This game is a challenge and a work of art.

continued on page 34



PINBALL CONSTRUCTION SET

25 HONORABLE MENTIONS
Educational Software Worth Considering

Name of Program	Cassette	Disk	Cartridge	Publisher	Age	Subject	Description
Addition & Subtraction	16K	24K	—	Edupro	5–9	Arithmetic	Fill-in's and mazes covering basic skills; more than one child can play at a time.
Alphabet Arcade	16K	24K	—	PDI	5–9	Language Skills	In first game you find underwater letters in alphabetical order. The more exciting game gives you words of increased difficulty to alphabetize.
Alphabet Zoo	NO	32K	—	Spinnaker	3–8	Language Skills	Three games: first gives pictures that coordinate with letters in alphabet; second two games are mazes in which you must (1) identify first letter of word, (2) spell whole word. Very nice for young ones.
Arrakis Advantage	NO	48 K	—	Prentice Hall	Jr./Sr. High	Algebra/ Biology Chemistry	Drill and practice with clear explanations; graphics weak.
Brain Strainers	NO	24K	—	Carousel	5 and up	Games involve memory & change	Games of matching musical notes; matching sounds with colors; concentration game with very small cards that are hard to read.
Courseware	16K	NO	—	Dorsett Educational Systems, Inc.	Jr./Sr. High	Most school subjects	Covers a lot of ground; mostly all text and a lot of on-screen reading.
Do-It-Yourself Spelling	16K	NO	—	PDI	All ages	Spelling	You're given two cassettes; one to run the program and one audio. You decide what spelling words to enter. Word list included.
Easy Reader Series	NO	48K	—	American Educational Computer	Grades 1–6 (separate disks)	Reading Comprehension	User reads story in accompanying book and answers questions about it on the computer. Needs a translation disk to run on 800XL.
Fraction Action	NO	48K	—	Unicorn	8–14	Math	Soon-to-be released program offers multi-screen chutes and ladder game/tutorial.
Fraction Fever	NO	NO	16K	Spinnaker	7–adult	Math	Game moves *very* quickly and the visual representation of the fractions is hard to grasp.
Getting Ready To Read And Add	NO	16K	—	Sunburst	Pre-readers	Visual discrimination, Shape recognition, Eye-hand coordination	Match letters and numbers in pictures of birds, dinosaurs, martians.
Incredible Laboratory	NO	48K	—	Sunburst	3–adult	Problem-solving	Trial and error to figure out how 15 chemicals combine to create colorful monsters.
Kids On Keys	NO	48K	—	Spinnaker	3–9	Letter/Word Recognition	Kids must type letters as they appear on screen, and words as pictures appear; features a moving hot air balloon.
Learning With Leeper	NO	NO	16K	Sierra-on-Line	3–6	Early Learning Skills	Child must maneuver through a maze; match numbers of objects; color in pictures. Bright graphics.
Match Maker Series	NO	48K	—	American Educational Computer	Grades 4,5,6	Language Skills	Match homonyms, antonyms, synonyms, metaphors, etc. Nice graphics for a drill and practice; good reinforcement. However, too arbitrary in certain answers, i.e., the answer "rapidly" was ok but "quickly" with same meaning and number of letters was not.

continued on next page

Name of Program	Cassette	Disk	Cartridge	Publisher	Age	Subject	Description
Match Wits	NO	48K	—	CBS Software	Family	Memory/ General Information	A colorful, lively game of Concentration in which user *can create new games*. More!
Math Mileage	NO	NO	16K	CBS Software	6–10	Math	You steer a race car on the shortest route to a number goal. Good for young ones.
Montana Reading Program	NO	32K	—	PDI	Pre-primer to 3rd grade	Learning Sight Words	Child is given a sentence and one word in it flashes. Word disappears and he or she must replace it.
Number Relationships	16K	24K	—	Edupro	5–9	Math	This needs a translator disk on 800XL. A maze to find greater than and less than; rhymes in math context. Instructions could be clearer.
Playful Professor Math Tutor	NO	48K	—	Screenplay	6 & up	Math	The more correct answers the child supplies, the better able he or she is to trap a ghost in a haunted house. Action's a little slow.
Safetyline	AUDIO	48K	—	Maximus	Not stated	Safety Instructions	A movie and games focus on how to cross streets, avoid strangers. Good concept. Games a little slow.
Square Pairs	16K	NO	—	Scholastic	7–12	Memory Games	A game of concentration; user can create own game.
Trains	NO	48K	—	Spinnaker	10–adult	Planning, money management	You run trains to pick up and deliver goods; strategic thinking involved in a game that is fun.
Turtle Tracks	24K	NO	—	Scholastic	9 & up	Introduction to concepts of programming	Uses the "turtle" concept of Logo to create designs.
Word Flyer	NO	48K	—	Electronic Arts	Pre-readers to good readers	Spelling	Letters and words fly around on screen and user must match them with others. Interesting graphics but confusing game elements.

Construction & Strategy Games

MUSIC CONSTRUCTION SET
Electronic Arts
$40.00, 48K disk

This uses the same principles as Pinball Construction Set. Use a pointing finger to choose the notes you want, set the tempo, and cut and paste to move sections of your music around. This program is not intended for those who know nothing about music, but it's a delightful creative tool for someone already in the process of learning an instrument. You are the composer, producer and final critic of your work.

Introductory baroque music draws you into the action; excellent graphics and the compelling tasks at hand can keep a budding musician busy for hours. Documentation for both Electronic Arts programs offers clear instructions and useful background information.

ADVENTURE CREATOR
Spinnaker
Ages 8 to Adult
$39.95, 16K cartridge

With this program you can build a graphic maze adventure game for others to play, or the computer can set up a game for you.

You'll find yourself setting up all the walls and corridors of a dungeon, hiding trapdoors and placing creatures to guard treasures. You set the goals for each game and distribute the tools at your disposal, such as torches, shields and hobbles that can freeze creatures.

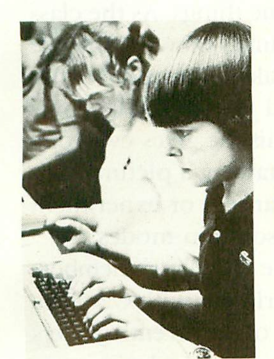
This is far less sophisticated-looking than the Electronic Arts construction sets, but perhaps it will be more appealing to young children because of that. It's certainly imaginative and fun. The players are in charge of their own universe here

CHESS VERSION 7.0
Odesta
$69.95, 48K disk

Hailed as a classic, Larry Atkin's Chess provides excellent experience for learning and playing the king of thinking games. A demo runs you through the various options and functions. From there the very precise manual takes you through a tutorial that will be invaluable if you're a beginner.

When you're ready to make a move the cursor shows you which are your legal choices. You progress from introductory levels through advanced modes. You're able to replay your game so you can see step-by-step just what transpired. You can also get a play-by-play of 30 all-time classic games.

continued on page 84



ATARI AT A SCIENCE MUSEUM

U.C. Berkeley's Lawrence Hall of Science Workshops

by MICHAEL CIRAOLO
Antic Staff Writer

Every year, thousands of fourth-to-sixth grade students discover Atari graphics programming at workshops in Lawrence Hall of Science at the University of California, Berkeley.

Reservations for these one-hour workshops cost $3.25 per student and must be booked months in advance. Some teachers put their kids on a bus for five hours to take part in the hands-on Atari sessions.

A workshop holds 16 to 30 students, no more than two people per computer. The hour starts with a quick explanation of input, output, the central processing unit and computer memory, plus [DELETE/BACKSPACE] and other keyboard items. Most youngsters at the classes have used computers before and are familiar with these basic concepts, if not the exact terms.



CREATING GRAPHICS

"You're about to enter a room which contains everything you need to draw a picture. What would you need?" asks instructor Nathan Reichner, a student at U.C. Berkeley, as he faces the fifth and sixth graders from Carson City, Nevada.

"Paper," respond a few students.

"Crayons."

"Color." Student response picks up quickly. There is little inhibition in this class.

Blue screens fill the room as Reichner tells the students how to turn on their computers.

"You want a piece of paper. To get one, type in GR.3." The teacher writes BASIC commands on the chalkboard as he talks.

As students enter the command for Graphics Mode 3, Reichner continues. "What color is our paper?" Students describe their screens, and the instructor makes sure everyone has gotten the correct result.

"To get a crayon—you have a choice of four colors—type in COLOR2. Now—why do you suppose there's no dot in front of us? That's right—you haven't drawn anything yet. Draw a point with the PLOT command. PLOT 5,6 will draw a COLOR 2 dot on our GR.3 paper."

Reichner gives the class 10 minutes to discover the screen's size and the other three colors by playing directly with the Ataris.

When everyone has discovered the size of the screen, Reichner introduces the DRAWTO command. He hands out graph paper with boxes corresponding to the boxes in Graphics 3 to help students plan the pictures they

continued on next page

will work on for the last 25 minutes of class.

During this time, Reichner answers questions about the Atari—what happens if you type in GR.2 or GR.7? How do you clear the screen?

ERRORS FORGIVEN

"Some people freak out when they see their first syntax error. We tell them that computers are very forgiving, that they don't mind your mistakes, and in fact, by the time the error message is on the screen, the computer has already forgotten the error," said Debbie Calhoon, curriculum developer and instructor.

In another class, the students are slightly older and more experienced. School computer instruction started for these children in kindergarten and half have personal computers in their homes.

This class of sixth and seventh graders moves faster than most. The instructor, Jeff Makaiwi, is straightforward.

"What's the first thing you have to do to use these machines? Right—turn them on. Now you're in text mode. We want to be in graphics mode. Type in GR.3, for a low resolution graphics mode—it's the easiest mode to start with.

"Pick the color you're going to draw with. You have four pens. Use colors 1–3."

PLOTTING COORDINATES

The class is familiar with graphing on a Cartesian coordinate system, so Makaiwi tells them to PLOT 5,5. "What do you suppose will happen if I type 5,10?"

"It'll draw a new dot," one student suggests. Sure enough. Makaiwi tells the class to find the largest x and y and the other three colors. "But first, tell me how you're going to do it."

Several students respond, "Trial and error."

Makaiwi tells the students about the two error messages most likely to appear in the search for the largest x and y, and tells students how to clear the screen.

This discovery period takes less than half the time it took the first class to learn the same things. As the class discovers the limits of what they've just learned, Makaiwi introduces the DRAWTO and SETCOLOR commands. After this, he gives everyone a choice: try drawing a picture with what you've learned, or experiment with higher resolution modes.

Three of the 16 class members choose to experiment with Graphics Mode 7. Several of the seventh graders choose to program their own graphics. The rest choose to draw pictures, experimenting in Graphics 3.

Makaiwi said, "After PLOT, they go where they want. I answer questions."

For the remainder of the class—about 30 minutes—Makaiwi wanders around the class offering individual suggestions as he's bombarded with questions. "How do I do this?" and "How can I make the computer do . . . ?" are frequent refrains. ■

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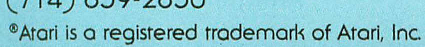
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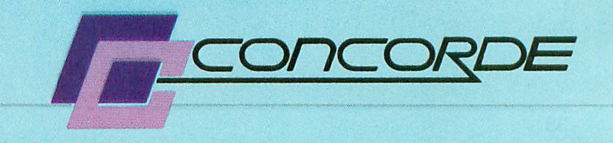
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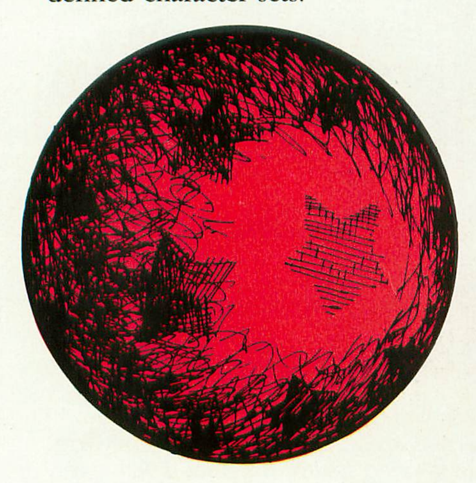


WHAT ARE PLAYER/ MISSILE GRAPHICS?

Atari's player/missile graphics use the special ANTIC and GTIA microchips to let you move animated figures anywhere on the video screen without disturbing the background.

A "player" is actually a section of RAM that contains an eight-bit-wide vertical bar from top to bottom of the screen. This vertical bar can be positioned horizontally anywhere across the screen.

Players can be created in the shapes you choose, with the same programming techniques applicable to user-defined character sets.

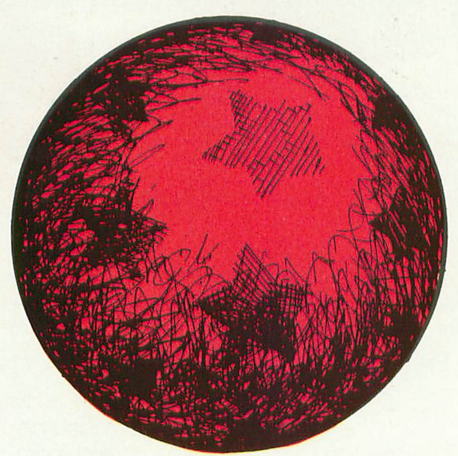


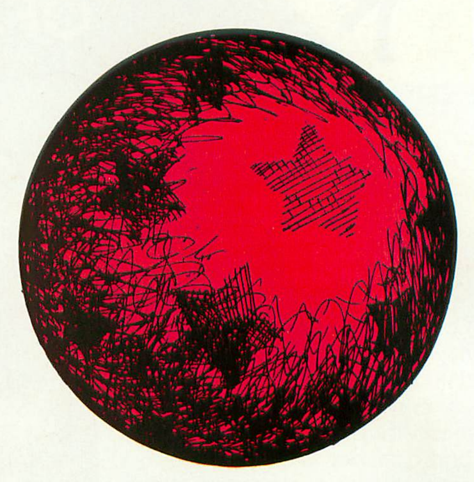
Atari computers can handle a total of four players and four missiles—each of which can be moved independently in a horizontal, vertical or diagonal direction.

Missiles are two bits wide, while the players are eight bits wide. Therefore, if you're designing a game that doesn't require missiles you can combine your eight available missile bits to create a fifth player.

Let's explore the applications of Player/Missile (P/M) graphics using a bouncing ball program. You will be able to enter the speed of the ball and its elasticity coefficient—how bouncy it will be. The ball (made out of a player) will not only bounce, but will "squash" when it hits.

We use GRAPHICS 3 even though P/M graphics works in any graphics mode. You may wonder, "Why GRAPHICS 3? It has such coarse resolution." That is exactly why we chose





it — coarse graphics means low memory overhead. No Atari graphics mode uses less memory than GRAPHICS 3.

There are three POKEs which must be executed to turn on P/M graphics: first POKE address 54279 with the memory page where P/M RAM begins:

```
POKE 54279, PMPAGE
```

Next, ANTIC microchip must be told that it should begin grabbing information from P/M memory.

A POKE of 42 into 559 will leave us with a normal screen, a two-line P/M display and an enabled Player direct memory access (DMA):

```
POKE 559,42
```

The third POKE gives ANTIC the go ahead to begin sending player-missile information to the GTIA microchip for display on the screen.

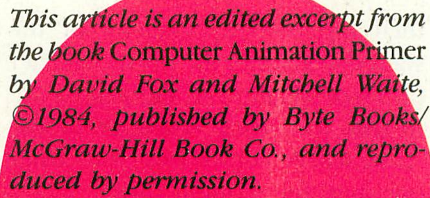
Player graphics are now enabled and ready to go.

PROGRAM THE

BOUNCING BALL

Player/Missile graphics tutorial

by DAVID FOX & MITCHELL WAITE



This article is an edited excerpt from the book Computer Animation Primer *by David Fox and Mitchell Waite, ©1984, published by Byte Books/McGraw-Hill Book Co., and reproduced by permission.*

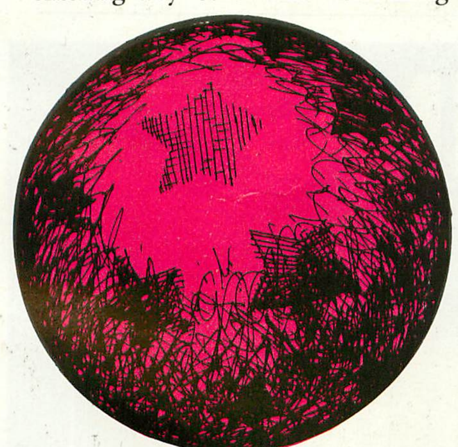
The BASIC program listing, which demonstrates the ideas discussed in the article, runs on all Atari computers of all memory configurations. No joystick is needed. Antic Disk subscribers, RUN"D:EXAMPLE8.BAS".

HOW TO USE THE PROGRAM

Type in the BASIC listing at the end of this article. It's called Example 8 because it's the eighth program in the book from which this article is excerpted. Check it with TYPO, and SAVE an extra backup copy. RUN the program, and you'll see a ball bouncing according the initial program values for velocity (speed) and elasticity. When the ball has finished bouncing, you'll be prompted for a new velocity. Type in any positive number. Next, you're asked for a value for elasticity. This value should normally be within the range zero to one, but if you use a value higher than one, each bounce of the ball will be higher than the one before.

ANALYSIS OF BOUNCING BALL PROGRAM

First look at line 70. This is where the first entry into the variable value table is made with string variable PLRO$. This line must be entered before entering any other line containing variables or the program will not work properly. Later, the location of the data for this variable will be moved to match the RAM for Player 0.



The subroutine on lines 100–130 is called when the value of a 16-bit number, X, needs to be separated into high and low bytes. This is necessary when the HIBYTE and/or LOBYTE will be put into memory address by a POKE.

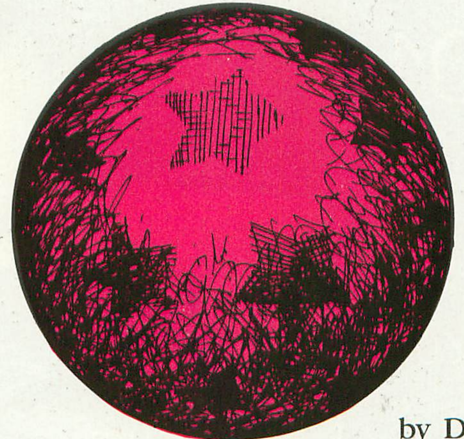
Lines 140–330 initialize the program's variables and send the computer off into four initializing subroutines. On line 150, three variables are DIMensioned—BLANK$ will be used to clear a temporary player buffer; PLR(n) will hold the RAM address of the four players; and HPLR(n) will be set to the address of the horizontal position registers for the four players.

On line 160, an Atari BASIC trick is used to fill BLANK$ with 128 ATASCII 0 (Atari ASCII) characters. After the first and last characters of BLANK$ are initialized to CHR$(0), the magic begins with the statement:

```
BLANK$(2)=BLANK$
   ↑          ↖
destination string   source string
```

BASIC copies the first character of the source string into the second character of the destination string,

continued on next page



then the second character of the source string into the third character of the destination string, and so on. In this way, each character of the string will be copied from the earlier one until the string is filled!

Line 170 sets the screen to GRAPHICS 3, turns off the cursor and PRINTs a message on the screen. Lines 180–240 call some special subroutines that we will cover next. Lines 300–320 PRINT information on the screen and set the initial VELocity (speed) and ELASTICity values. By elasticity, we mean the percentage of the ball's current velocity which remains when it hits the ground. An elasticity of 0.5 (50 percent) means that the ball maintains half its current velocity and loses the other half every time it bounces. An elasticity of 1.0 (100 percent) is a perfect bouncing ball. It never loses any energy and will bounce forever. The closest to perfect we have seen in real life is about 0.85 (85 percent) for a toy super ball. An elasticity of 0 (0 percent) is a ball that will not bounce at all — it just hits the ground and dies.

The subroutine (5000–5360) reserves memory space, in the form of strings for the frame data, (frame means a single screen picture, just like in a movie). Line 5100 reads the number of frames used in the sequence (FRAMES = 3), the size of each frame in bytes (FRMSIZE = 7), and the number of players used in this program (NUMPLRS = 1). The data is located on line 20060. On line 5120, the variable PLRFRMMEM (PLayeR FRaMe MEMory) is set to the total number of bytes necessary to store the frames for each player. Line 5130 sets FRAMEMEM (FRAME MEMory) to the total number of frame bytes needed for all players.

PERFECT ELASTICITY

On line 5170, string memory is reserved for three variables. BUFFER$ is the temporary buffer used in vertical player movement. FRAME$ will hold the current frame to be displayed and FRAMEMEM$ holds all frames for every player.

In this section 7000–7130, memory is reserved for the players, and P/M graphics are enabled.

Line 7020 tells ANTIC where to find PM RAM by placing the starting memory page number (TEMP) in 54279 (D407 Hex). The actual RAM address of PM RAM is calculated and stored in PMBASE in line 7030.

In lines 7040-7070, two arrays are initialized. PLR(I) holds the RAM address for Players 0 through 3. HPLR(I) holds the address of the horizontal position register for each player.

In line 7080, SDMCTL, address 559, is initialized and ANTIC begins DMA from player RAM. A POKE of 42 into 559 leaves us with a normal screen, a two-line P/M display and enabled player DMA, but no missiles.

In line 7100, ANTIC starts sending player information to GTIA so it can

be displayed on the screen when POKEd with a 2.

In lines 9000–9080, BASIC is tricked into moving a string variable to coincide with Player 0 RAM. In lines 9010–9020 the locations of the string array area and the variable value table are calculated. In 9030 the number of bytes from the beginning to the string/array area to the start of Player 0 RAM is stored in OFFSET. Line 9040 uses the HI/LO byte subroutine on OFFSET so these values can be POKEd into the variable value table and the first variable in the program is now relocated!

The loop in lines 10000–10140 and 21000–21060 reads the frame data for the bouncing ball into the string FRAMEMEM$. Each BYTE is converted to a character with CHR$.

The main animation loop (lines 400–570) controls the movement of the ball on the screen.

On line 410 four constants are initialized. BOTTOM is the lowest vertical screen position to which the ball will go and is analogous to the floor. XPOS is the starting horizontal position of the ball (off the xcreen to the left). TIME holds the elapsed time from the moment the ball is launched or bounced. HORIZ holds the horizontal velocity. This value is constant until the ball begins to roll.

The ball is moved to the left of the screen in line 420, and the value of ELASTIC is checked in 430. Later, when input is accepted from the keyboard, this line makes sure that if the elasticity is very low, there is at least one bouncing noise when the ball hits the ground.

FORCE OF GRAVITY

Starting at line 440 is the gravity calculation. The effect gravity has on the motion of an object can be represented by the formula

```
-16*TIME*TIME
```

This shows the acceleration of gravity over time. By subtracting the above value from the current velocity (VEL) multiplied by TIME, the current height of the ball off the ground is obtained:

```
VEL*TIME-16*TIME*TIME
```

This must be subtracted from the value of the ground (BOTTOM) to convert the number to screen coordinates:

```
YPOS=BOTTOM-(VEL*TIME-
16*TIME*TIME)
```

FRM0, the number of the current frame to be displayed, is set to 1 (the round ball).

Line 460 checks for contact with the ground. If the ball has hit, (YPOS will be greater than or equal to BOTTOM), the ball's VELocity is recalculated by multiplying the current VELocity by ELASTIC. With the initial ELASTICity of 0.8, 80 percent of the current velocity will be conserved and 20 percent lost. TIME is set to 0 since as far as gravity is concerned, the ball is first starting out and was thrown by the ground.

Line 470 checks to see if the ball is still on the screen. If not, the animation loop is exited, and new values can be entered from the routine starting at 600.

Now that all the values are calculated, the ball will be positioned on the screen. The horizontal position of the player is set in line 480. On 490 the correct frame is transferred from FRAMEMEM$ (where all three frames are kept) to FRAME$. Lines 500–520 position FRAME$ at the proper vertical position in player RAM. The ball is now in place.

In line 530, the horizontal position of the ball (XPOS) is incremented. Line 540 turns on the bounce sound if the ball has just struck bottom and the velocity is high enough. If SNDFLAG was set in line 430 (low elasticity), the sound will be heard on the first bounce.

In line 550, TIME is incremented by 0.15 and the loop continues at line 440 if the velocity is greater than 0.5. A different value can be substituted for the 0.15 to stimulate the ball bouncing in slow or fast motion. Use a smaller TIME increment to make the ball move in tinier increments (slow motion).

Finally, line 560 will be reached if the velocity of the ball is so slow that it can only roll rather than bounce. HORIZ is decremented to simulate the effect of friction on the ball's horizontal velocity. If the ball is still rolling (HORIZ will be greater than 0), frame 1 is selected, and the program jumps to 470 since the bouncing calculations of 440–460 are no longer needed. If the ball has stopped rolling, the program will fall through the routine at 600.

Lines 600–690 are executed after every ball finishes bouncing to allow you to enter your own velocity and elasticity values. The ball is moved off the screen in line 610. The TRAP command is used in line 640 to trap any INPUT errors which may occur. If there are any, the program will jump to line 630 and the values can be reentered. In line 670, after executing the "cursor off" POKE, at least one PRINT statement must be executed before the cursor vanishes. Line 680 turns off error trapping by setting TRAP to a nonexistent line number, and the animation loop is restarted.

CHANGING AROUND THE PROGRAM

Try the following modifications:

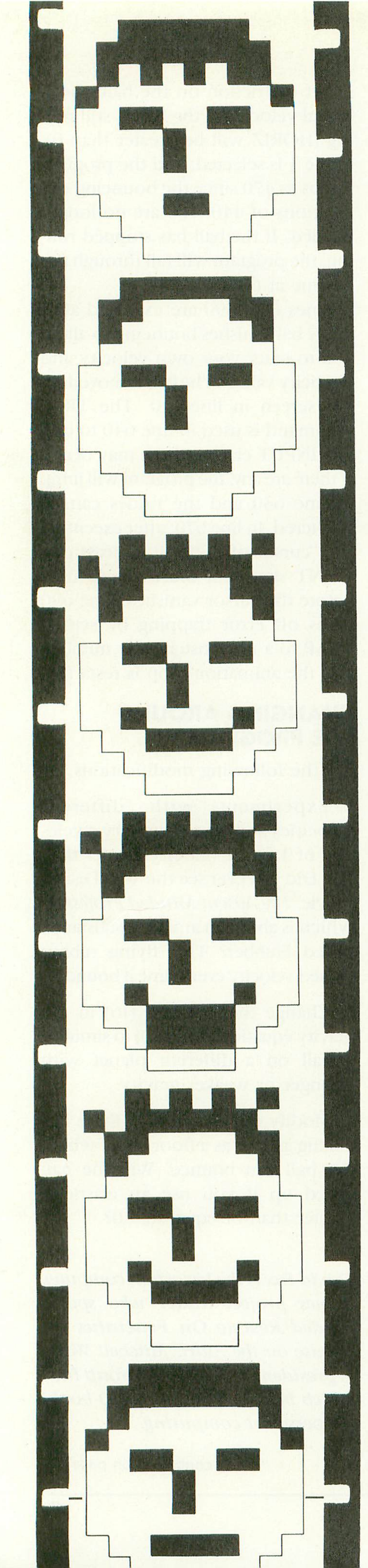
1. Experiment with different velocities and elasticities. Try a velocity of 1 and a velocity greater than 1.0. Did you ever see the Walt Disney movie, *The Absent-Minded Professor*, which is about an amazing substance called Flubber? This flying rubber gained velocity every time it bounced.

2. Change the constant (16) in the gravity equation (line 440) to simulate a ball on a different planet with stronger or weaker gravity.

3. Modify the program so there is a ceiling as well as a floor off of which the ball can bounce. Will the ball speed up if you use an elasticity greater than or equal to 1.0?

*David Fox is the Lucasfilm computer games project leader who spearheaded **Rescue On Fractalus** for release on the Atari. Mitchell Waite is president of the Waite Group Inc., which has produced over 30 books on personal computing.*

listing continued on page 57



ANTIC 4/5 EDITOR ANIMATOR

by PAUL CHABOT

This article lets you design and produce smooth animation sequences in four colors with blocks of characters in ANTIC Modes 4 and 5 (Graphics 12 and 13 on XL series computers). The BASIC programs require a disk drive and a minimum of 48K memory, and run on all Atari computers. Antic Disk subscribers, RUN "D:ANIMATE.BAS". All necessary data files are on the disk.

This program lets you edit characters in ANTIC Modes 4 and 5, combine them into three-by-two character blocks, and combine the blocks into fast, four-color animation sequences. ANTIC 4 is one of Atari's two special character modes. With planning, you can use it to simulate Atari's highest resolution four-color mode, Mode 7½, with no loss of resolution, and animation is easy to create. An added benefit is that an ANTIC 4 screen requires only about one-seventh the memory of a Mode 7½ screen. ANTIC 5 gives you characters that are twice as high as ANTIC 4. If you want to know more about this overall subject, read "Character Graphics," **Antic**, February 1984.

(Please note: This is a richly powerful program. We've tried to make the instructions as clear as possible, but you may need to re-read this article several times in order to fully grasp how all the program elements fit together. —ANTIC ED*)*

GETTING STARTED

Type in Listings 1 and 2, check them with TYPO, and SAVE backup copies of each. Give Listing 1 the filename D:ANIMATE.BAS and call Listing 2 D:MAKESETS.BAS. Make sure there's a disk with copies of both ANIMATE.BAS and MAKESETS.BAS in the drive, and RUN "D:ANIMATE.BAS". There will be a title screen that changes color after a few seconds. The program ends by RUNning D:MAKESETS.BAS, which creates the binary data files ROM.SET and ANTED.SET. The program MAKESETS.BAS ends by LOADing ANIMATE.BAS. When the READY prompt appears, LIST 72 and change D:MAKESETS.BAS to D:ANTED.BAS, then execute a SAVE "D:ANIMATE.BAS" to store the program with the altered line 72.

Now type in the main program, ANTED.BAS (Listing 3), and Listing 4, HYPNO.BAS. Check and SAVE both, then RUN "D:HYPNO.BAS". The screen will go black for a few minutes

while the program reads and checks its data. If it finds an error, it stops, turns on the screen, and prints an error message. If there are no errors, press [RETURN] at the prompt to create the animation file HYPNO.2X3. Now when you RUN "D:ANIMATE.BAS" (make sure ANTED.BAS, ROM.SET, HYPNO.2X3 and ANTED.SET are on a disk in the drive) you'll see the title screen, the background color will change, and the main program will load and begin to initialize.

Soon you'll see the editing screen and the message " <any key> — to BEGIN." The dazzling opening animation sequence is provided by the data file HYPNO.2X3. Press a key, and the program will replace HYPNO with the standard Atari character set and copy the first figure (figure #0) to the grid, and you're ready to go.

THE DISPLAY SCREEN

This section contains brief descriptions of the various sections of the editing screen. Refer to Figure 1.

GRID (upper right): A three-color 16-by-12 checkerboard for editing a two-by-three block of characters. When editing, you control a small cursor in this region with the joystick.

EW (upper right): There are four Edit Windows to the right of the grid. You'll see three copies of the grid object in ANTIC 4, and below them, one ANTIC 5 copy. These images immediately reflect changes you make to the grid object.

AW (upper center): There are four Animation Windows; three ANTIC 4 copies to the left of the grid, and one ANTIC 5 copy to the left of the ANTIC 5 EW. These let you view animation sequences you create.

AN area (upper left): Numbered 0 to 9 are the 10 ANTIC 4 animation frames in two rows. ANTIC 5 copies of the frames appear in a single row just below. Each frame will be one step, or view, in your final animated sequence. Sequences may be of any length between one to ten frames, inclusive.

MAIN MENU (center): Contains the program functions. To choose a function, press the appropriate letter *without* pressing [RETURN].

FN area (bottom): There are 20 ANTIC 4 figures, each made up of a group of six characters. This is the figure set being edited. The Figure Number (FN) used throughout the program is the number of the object from this group that you're editing in the grid.

GRID EDITING

This is the default, or normal function of the Editor/Animator. You control a small cursor in the grid area with a joystick. Press the trigger to switch between setting a pixel in the current color and turning the pixel off (or setting it to the background color).

The current color appears in a vertical bar on either side of the grid, and you can change it by pressing any key that doesn't correspond to a menu selection (e.g. the space bar). Hold the trigger down while pressing the joystick to draw a continuous line in that direction, regardless of the pixels' previous state. You'll see any alterations you make to the grid in each EW region, in figure number FN at the bottom of the screen, and in animation frame AN.

MAIN MENU

Choose a menu selection by pressing the indicated key. No [RETURN] is needed.

A (Edit): Use this to select which figure to edit. Your joystick controls a large box-like cursor in the bottom FN region. A copy of the figure currently inside this cursor appears in all AW regions. Pressing the trigger selects that figure and moves a copy into the EW regions. If you press any key before pressing the trigger, you'll abort the process and return to grid editing. After you choose the figure, you must choose the animation frame into which to place the figure. Push your joystick to move the cursor in the AN region, and press the fire button to place the figure. The figure is copied into that frame as well as the grid. Finally, you're turned to grid editing.

B (Next): This is a handy aid for producing animation sequences. The current AN and FN numbers (located just above the Main Menu on the right side) are both incremented and the current grid object is copied to the next animation frame. The grid isn't altered. You can simply make minor changes for this frame in the sequence and press [B] again to go to the next frame.

C (Save): Allows you to save the current figure (at screen bottom) to a disk file. After you press [C], a directory of the current disk appears. Type in a filename at the prompt, press [RETURN], and then [S] to complete the save. The program adds the extender .2X3 to all file names. Pressing any other key at this point aborts the process and returns you to grid editing.

D (Load): Analogous to Save, except you're loading from a disk file. This affects the AN region and resets both AN and FN to zero.

E (Topload): Use this to mix and match parts of your data files. This loads only 512 bytes, so only to the top row of the figure set is affected. Note that this function *does not* alter the AN region. Use in combination with M (Swap) to combine halves of two different figure set files.

F (Animate): This allows you to see your animation after you've created the frames in the sequence. At the start, each of the Animation Windows contains a copy of AN frame #0. Press [N] to see the next frame in the same window. This continues until the animation limit is reached (see Menu selection G), at which point the sequence restarts with frame 0. Animate continuously by holding down the joystick trigger. Escape this function by pressing any key other than [N].

G (IncAL): Use this before using the Animate function (selection F). The current animation limit (AL), or final frame in a sequence, is indicated by a block of color immediately to the right of that number in an AN area. Press [G] to increase the AL and move the block to the next frame. After nine, the value of AL wraps around to zero.

H (Clear): Clears the grid, each Edit Window, and the current FN and AN areas.

continued on next page

I (Clear S): This clears the section of the grid that contains the cursor. There are six sectors whose sequence corresponds to the order of the six characters being edited. Across the top are sectors 0, 2, and 4, and across the bottom are sectors 1, 3, and 5.

J (Restore): For peace of mind. This restores the figure you're currently editing to its original state at the time of the most recent load. When you load a figure set, two sets are actually loaded. The second set is never altered and is used for this purpose.

K (Copy to): The joystick controls the FN cursor. Pressing the trigger copies the contents of the current Edit Window to the selected figure. The previous data for that figure is discarded. Neither an AN nor FN is affected.

L (Exchange): The joystick controls the FN cursor. Pressing the trigger copies the contents of the current Edit Window to that figure. That figure is copied to the current FN. Then FN is altered to reflect the new location of the figure you're editing.

M (Swap): This swaps the top ten figures in the current set with the bottom ten. FN is altered appropriately. Use this together with function E (Topload) to combine parts of different figure sets.

N (AN to F): You first control the AN cursor and press the trigger to select an animation frame. Next you control the FN cursor to select a position in the figure set to place that animation frame.

O (Color): A special menu will appear. You control the asterisk's (*) movement with the joystick. Pressing the trigger increments the corresponding value of hue or luminance. You'll see the effects of changing the color immediately throughout the screen. Press [R] to reset the original program (default) values. Any other key terminates this section.

Cursor keys (shift grid): Use the cursor keys without [CTRL] to shift the entire contents of the editing grid one row in the desired direciton. The last row becomes blank.

HOW IT WORKS

What this program calls a figure set is actually a character set whose members the editor combines into twenty groups of six, for a total of 120 characters. A complete character set has 128 characters, though, so this program discards the initial four and final four characters. You can use your own character set that's produced with another utility (you must add the .2X3 extender to the filename), but unless you've designed the set specifically with this program in mind, the characters probably won't be grouped correctly.

The program creates animation by loading two character sets into RAM, telling the Operating System to use one, and then copying blocks of 48 bytes (one two-by-three character matrix) from the second to the first at machine-language speed. This changes the data in the current character set, which is reflected immediately on the screen. Each animation frame contains six characters of eight bytes each, so the program must move 48 bytes at a time. Machine language accomplishes this so fast that the animation looks smooth.

DEMONSTRATION PROGRAM

Listing 5, called DEMO.BAS, shows techniques for using animation sequences in your own programs. Type in this program, use TYPO to check for typing errors, and SAVE a copy. When you RUN it, make sure there's a disk with ROM.SET on it in drive 1. When the program starts, you see a screen full of rapidly animated two-by-three groups of characters.

Plug in a joystick and move it vertically or horizontally, and you'll see one of the groups of characters move around the screen according to joystick movement. This group is the "eater," and the others are "dots." The object of this demonstration game is to move the eater around the screen to "eat" the dots. If you press the fire button, more dots appear while the background changes colors. The edges of the screen show the twelve individual characters in two blocks.

To create this game, I first determined which characters to print to the screen. These make up your "windows," into which data from the successive animation frames will be copied to create the animation. The dots are comprised of the first six characters in the second half of the character set. The "eater" uses the second group of six characters in the set. The pointers to these two areas in the set are set in line 230. Because of the difference between internal character code (the order of the characters within the character set)

continued on page 86

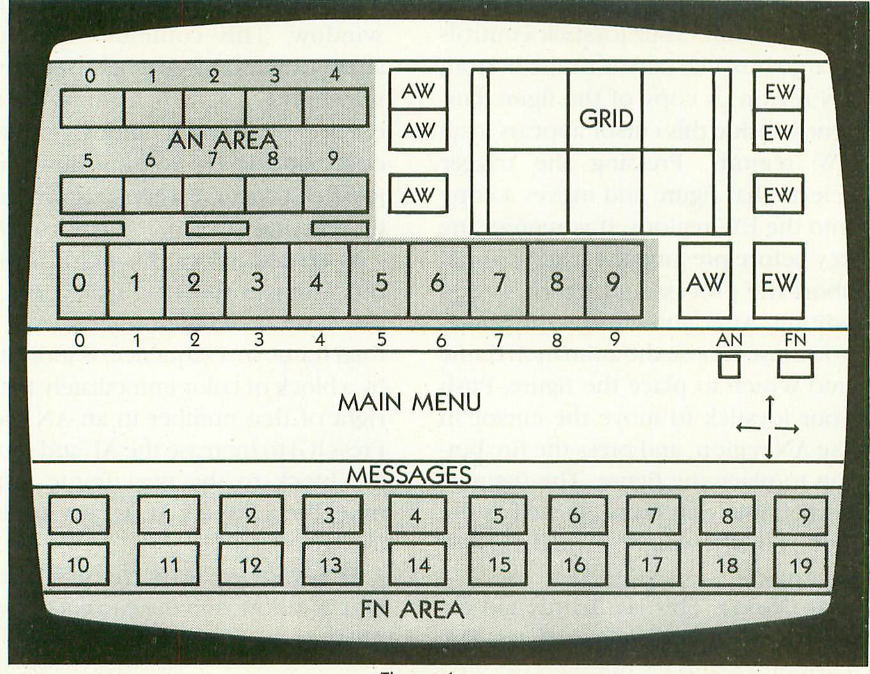


Figure 1

JACKS

Short, elegant program for the classic kids' game

by COY ISON

Computer JACKS is patterned after the children's game that most of us are familiar with. You bounce a ball and pick up a certain number of your seven jacks. The BASIC program runs on all Atari computers. Antic disk subscribers RUN "D:JACKS.BAS".



Type in the program, check it with TYPO and SAVE a backup copy. RUN the program and plug your joystick into Port 1.

You will be prompted to touch the red fire button to throw the jacks. Next you will be prompted to touch the red fire button to bounce the ball. When the ball goes up into the air you must move the cursor line and pick up a jack on the screen.

You are required to start with your one's, which means that you need to pick up one jack and move back under the ball before it hits the ground. After having completed this you will be allowed to throw the jacks and bounce the ball again. This time you will be on your two's and must continue until you have worked up to your seven's.

Pick up only the number of jacks you are on. If you are on your three's and only pick up two jacks you must go back to your two's. If you pick up four jacks you also have to go back to your two's. You must also catch the ball before it hits the ground or you will be required to go back to the previous number of jacks.

The game of JACKS is a simple concept that was an interesting challenge to program. I hope you have fun playing JACKS — and get better scores than I do. I've never made it to my seven's and picked them all up!

JACKS VARIABLE LIST

A —Used to locate jacks
LP —Loop variable
X —Loop variable
OV —Cursor position (X)
DO —Cursor position (Y)
S —Joystick value (0)
DX —X Joystick movement (0,1,−1)
DY —Y Joystick movement (0,1,−1)
BM —Ball movement up/down
N —Add to BM (1,−1)
JV —X Position of jacks (random)
JD —Y Position of jacks (random)
CT —Jack count picked up
H —Number of jacks holding
PU —Number of jacks picked up
SC —Start of screen memory
QQ—Locate jack position — do not over print

JACKS TAKE-APART

100- Control initialization.

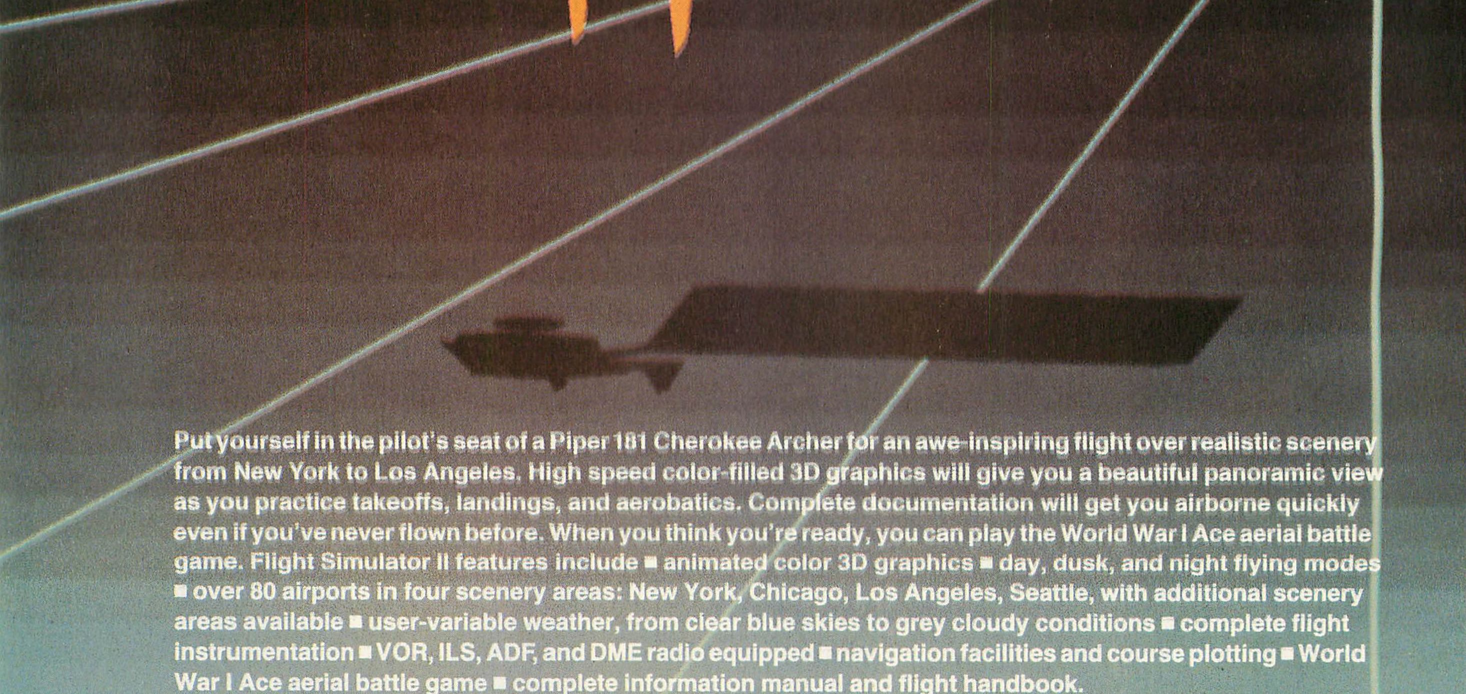


continued on page 49

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DIVER

Bonus undersea action game

by STEVE MAY



This arcade-style BASIC action game requires a joystick and runs on all Atari computers of any memory configuration. Antic Disk subscribers RUN "D:DIVER.BAS".

First type in the listing. Check it with TYPO, and SAVE an extra copy as a backup. Now RUN the program.

You are in command of Diver, a small one-man diving bell. You are exploring dangerous reefs in search of chests containing precious treasure. Some chests, however, may only contain sand and seaweed. There are many hazards and you have only three Divers.

The joystick moves Diver up, down, right, and left. To pick up treasure chests, position Diver directly above a chest and press the joystick button. To avoid danger, it may be necessary to surface. Go to the top and press the joystick button. To submerge, press the button again.

If Diver hits a reef or an an enemy object he will be destroyed. Diver has a limited supply of oxygen, indicated by an "oxygen bar" at the bottom of the screen. Oxygen may be replenished by surfacing.

BEWARE THE OCTOPUS

The ocean is inhabited by large and aggressive octopi. One touch from them will destroy Diver. Diver is safe from an octopus's relentless pursuit only when surfaced.

Occasionally, a sea mine may appear. It is large and has a timer in the center. When the timer reaches zero, everything under water is destroyed. The only way Diver may avoid this disaster is to surface.

Submarines patrol these waters frequently, so watch out! The submarine's sonar will take a couple of seconds to detect you. When it does, it fires a laser that never misses! But, the sonar cannot penetrate the reefs, and Diver is safe when below the reef's highest point. Diver also is protected from the sub when surfaced.

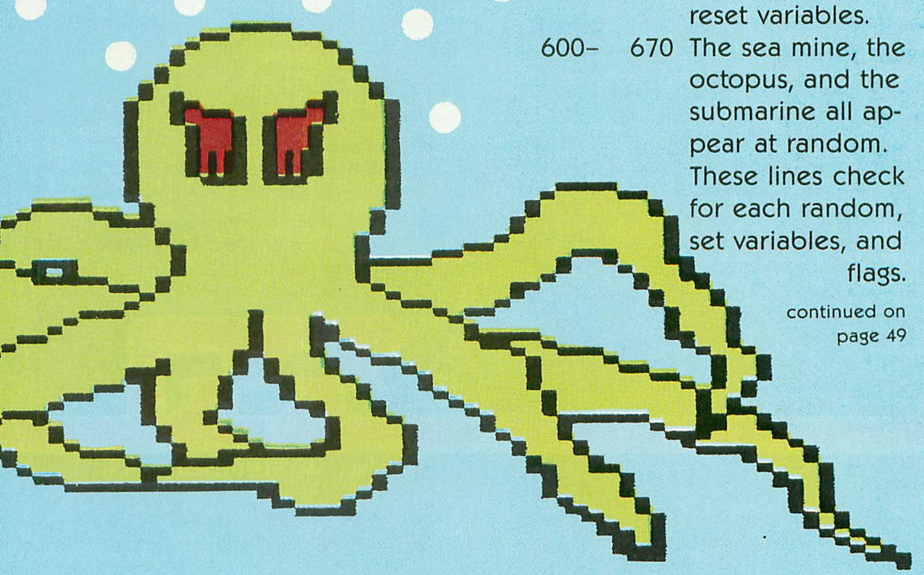
Surfacing will reveal what your treasure chests contain! Rewards range from zero to 150 points. You receive ten points for just picking up a chest. One point is deducted for each unit of oxygen remaining when you surface. A free Diver is added when you advance to the next skill level if you have less than three Divers already.

After a few dives, you should be a regular Jacques Cousteau.

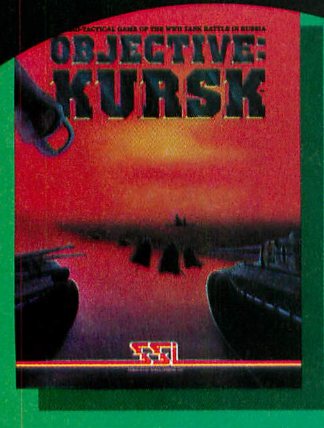
DIVER TAKE-APART

10– 30	Initialization.
100– 200	Player input.
300– 310	Move Diver and check for collision.
400– 410	Get treasure.
420– 440	Surfacing.
450– 490	Determine the treasure found.
500– 570	Sink Diver and reset variables.
600– 670	The sea mine, the octopus, and the submarine all appear at random. These lines check for each random, set variables, and flags.

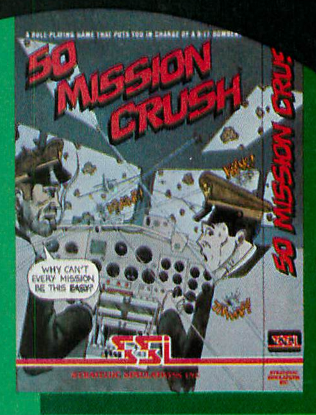
continued on page 49

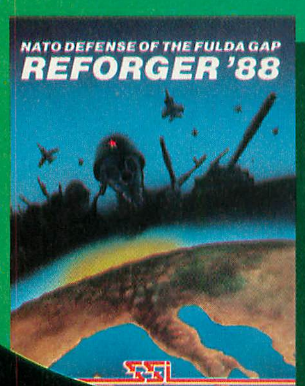


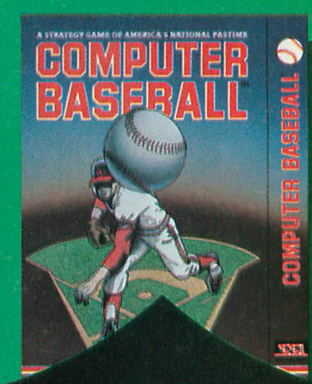
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Jacks

continued from page 45

110– 199	Move ball.
140– 150	If ball reaches top then (N=+1) change direction.
200– 250	Up date # need to pick up and # that you are holding.
260– 400	Joystick route — main loop.
330– 360	Check for ball collisions. Check for jack collisions. Check for wall collisions.
370– 380	Change Over/Down variables. Print Cursor line at OV,DO.
390	Every second loop move ball one space.
410– 490	If ball is caught clear jacks up date # to pick up etc.
500– 640	Draw screen.
650– 740	Prompt to throw jacks and bounce ball.
750– 850	Random place jacks.
770	Position ball at bottom of screen.
790– 840	Place seven jacks at JV, JD. JV=over position JD=down position
820	Make sure jacks are not placed on top of each other.
900– 960	Game over — Play again?
1000–1130	Download character set and redefine new characters.

School teacher Coy Ison is a self-taught BASIC programmer. Ison and his wife have written educational programs and games for about four years.

listing continued on page 67

Diver

continued from page 47

700– 740	Check flags and branch to appropriate subroutines.
800– 840	Advancement to next coral reef.
850– 870	Advancement to next skill level.
900– 905	Set up text window.
910– 940	Print score and other statistics.
1000– 1030	Draw coral reef.
1100– 1146	Data for coral reefs.
1200– 1240	Game over.
1300– 1320	Initialize treasures and values for each.
1500– 1570	Title page.
2000– 2110	Subroutine for the octopus.
2200– 2290	Subroutine for sea mine.
2300– 2400	Subroutine for submarine.
3000– 3060	Sound routines.
30000–30016	Initialization for redefined character set.

DIVER VARIABLES

BX	—x coordinate of sea mine
BY	—y coordinate of sea mine
C1	—counter for octopus
C2	—counter for mine
C3	—counter for sub
CHR	—ATASCII value of character from LOCATE command
CR	—coral reef #
DL	—location of Display List DL=PEEK(560)+PEEK(561)*256
DV	—# of Divers left
DV$	—string container Diver
DX	—x coordinate of Diver
DY	—y coordinate of Diver
F1	—if F1=1 then sea mine is present
F2	—if F2=1 then Diver surfaced
F3	—if F3=1 then octopus is present
F4	—if F4=1 then sub is present
F6	—flag for start of game
HSC	—high score
HT	—height of each coral reef
NDX	—new Diver x coordinate
NDY	—new Diver y coordinate
NOCX	—new x coordinate of octopus
NOCY	—new y coordinate of octopus
OB	—total # of treasure chests collected
OC	—oxygen counter
OCX	—octopus x coordinate
OCY	—octopus y coordinate
OX	—# of oxygen units
OX$	—string containing "oxygen bar"
PT(n)	—value for each string
S	—set to STICK(0)
S$	—string for sub
SC	—score
SK	—skill level
START	—starting location of redefined character set. START=(PEEK(106)+1)*256
SX	—x coordinate of sub
SY	—y coordinate of sub
TC	—# of treasure chests in possession
TC$	—string containing treasure chests
TICKER	—value of ticker on mine
TR$	—contains all treasure contents
X(n),Y(n)	—used for sinking of Diver
C,N,PT,X,X1,Y,Z,Z1	—multi-purpose variables

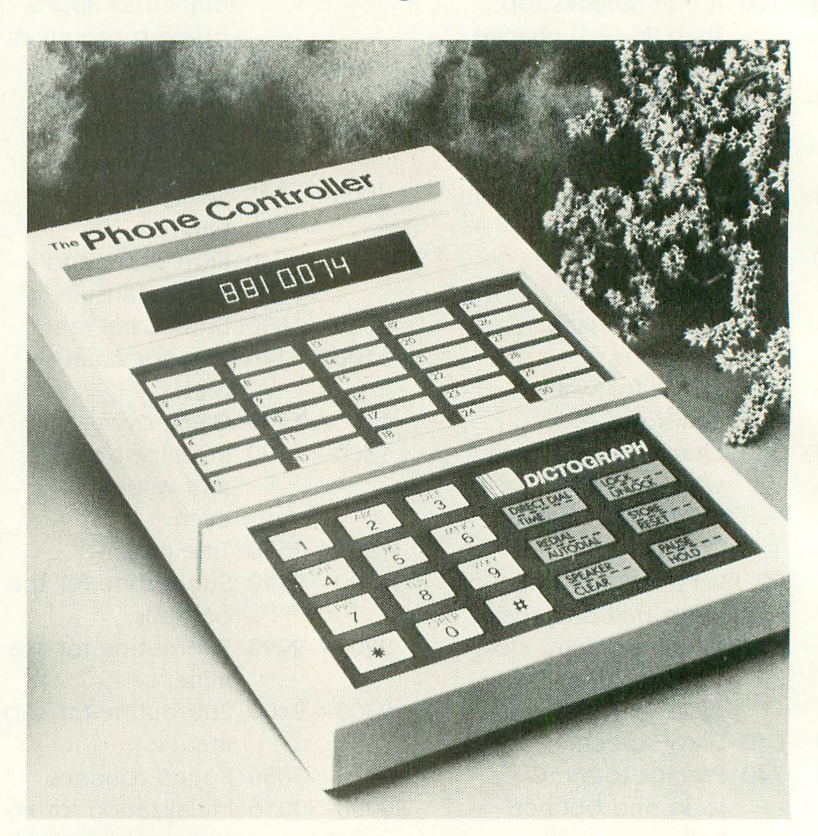
Steve May, 15 years old, is a Mansfield, Ohio high school student. He has been programming with Atari computers for over four years, and is currently teaching himself machine language.

listing continued on page 69

For Business or Private Phones

10 Ways Dictograph's New Phone Controller Can Increase the Service You Get from Your Phone, Speed Your Calls and Lower Your Charges.

From the people who invented the Intercom, Hearing Aid and Smoke Detector



This small electronic marvel — only 8" by 6" by 1½" — lets you do things with your telephone you never thought possible. Read these 10 ways Dictograph's new Phone Controller outdates old-fashioned telephoning —

1. Digital Time Monitor. Alerts you to minutes you are talking, long distance or locally. Keeps 5 minute calls from going to a half-hour.

2. Time-Saving Callback. Busy signal? Phone Controller calls back *for* you every 60 seconds. Keeps you from forgetting to.

3. One Touch "Memory" Dialing. Get at the touch of a finger 30 numbers called most frequently. Real time saver.

4. Touch Dial Converter. Lets you call by touch on rotary dial phone.

5. MCI and Sprint Compatible. No need to buy or pay for installation of a touch-tone phone.

6. Hold Button. Puts callers on hold so you can talk with others around you. More secure than hand over mouthpiece.

7. Built-in Speaker. Call without having to lift and hold phone till someone answers. Also lets others listen in.

8. Error Eraser. Dial a single wrong number, no need to redial whole number. Push clear button, error is erased.

9. De-Programming Fail-Safe. Back-up battery power keeps programming intact and in place in event of power outage.

10. Eliminates Phone Use. No need to dial from phone. Touch-dial directly from dial pad of Phone Controller.

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The Dictograph Phone Controller can be placed on desk top or wall-mounted. For single line service, plug into Bell modular jack. For multi-line service, specify Model PC 30 ML.

All Controllers have 90-day parts and labor warranty and are UL, CSA, FCC and Bell approved. Prompt service if needed. If you are not fully satisfied, return unit — or units — undamaged and in original carton within 15 days of receipt and your money will be refunded in full.

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Dept. PC 64

Please send ( ) Dictograph Phone Controller(s) at cost per instrument of $129.92 single line, $148.95 multi-line (Model PC 30 ML.)
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Antic proudly presents our new type-in listing section—includes every full length program from this issue. Easier to read, easier to type, easy to remove and save in a binder if you wish.

DISK SUBSCRIBERS: You can use all these programs immediately. Just RUN the correct filenames shown at the beginning of each accompanying article.

ERROR FILE

Following are the known program listing errors from the most recent issues of **Antic**. See the *Help* page in this issue for any additional last-minute corrections. If an error is not shown on these pages, all programs seen in **Antic** should RUN as published. The vast majority of problems that people have in getting a program to work properly are caused when they make common typing mistakes.

SPACED-OUT NUMBERS

July '84

For non-XL machines, change line 31040 as follows: 31040 D=INT (VAL(C$)/INT (100∧(68−B(0))+1.0E−03))

COLOR FINETUNER

June '84

The second line of the fragment of assembly code labelled "INSTAL" should read: LDX #CHECK1/$100. The last line of the first section of code labelled "CHECK 2" should be BNE EXIT. The second line of "FCOLOR" should be LDA PCOLRO,X.

USE BASIC TO ANIMATE

June '84

In line 1310, what looks like a semicolon should be a colon.

RISKY RESCUE

April '84

Runs as published. Readers are having problems with inverse closed parenthesis' in lines 610–730. They look different but are all the same character.

UPDATE DISKS WITH NOTE AND POINT

April '84

Line 160 should read GOTO 600. Lines 410, 440, 470, 500 and 530 should all begin: INLEN=LEN(USER$)

MATH WIZARD

April '84

The 17th string character in line 50 should be an inverse zero. This will generate the proper TYPO table.

MATCHBOX TIC-TAC-TOE

April '84

Change line 2078 to: 2078 CLOSE #3:RETURN

LITTLE BROTHER GROWS UP

April '84

Various components listed within the article are incorrect. Go by the schematic which is correct.

6502 DISASSEMBLER

March '84

Will not run in ValForth; requires FigForth or Atari APX Forth. In Screen #30, lines 10 & 13 should read: 10 0< IF DROP DROP I 0 LEAVE 13 0 VARIABLE POINTER

ESCAPE MAZE

March '84

Add the following line: 75 HIT=0

LISTING CONVENTIONS

Our custom font listings represent each ATASCII character as it appears on the video screen. You generate some characters by a single keystroke, for example, the regular alphabet. Others require a combination or sequence of keystrokes. In this table, ESC means *press and release* the escape key before pressing another key. CTRL or SHIFT means *press and hold* the control or shift key while simultaneously pressing the following key.

The Atari logo key (ʌ) "toggles" inverse video for all alphanumeric and punctuation characters. Press the logo key once to turn it on; press again to turn it off. In the XL line there is no logo key; inverse video is controlled by the Reverse Video Mode key. Decimal values are given as reference, and correspond to the CHR$ values often used in BASIC listings.

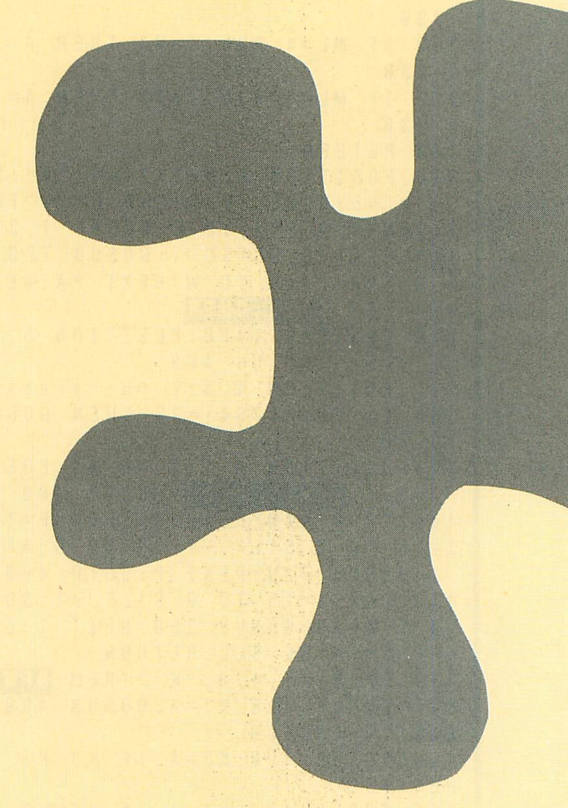
NORMAL VIDEO			INVERSE VIDEO		
FOR THIS	TYPE THIS	DECIMAL VALUE	FOR THIS	TYPE THIS	DECIMAL VALUE
	CTRL ,	0		ʌCTRL ,	128
	CTRL A	1		ʌCTRL A	129
	CTRL B	2		ʌCTRL B	130
	CTRL C	3		ʌCTRL C	131
	CTRL D	4		ʌCTRL D	132
	CTRL E	5		ʌCTRL E	133
	CTRL F	6		ʌCTRL F	134
	CTRL G	7		ʌCTRL G	135
	CTRL H	8		ʌCTRL H	136
	CTRL I	9		ʌCTRL I	137
	CTRL J	10		ʌCTRL J	138
	CTRL K	11		ʌCTRL K	139
	CTRL L	12		ʌCTRL L	140
	CTRL M	13		ʌCTRL M	141
	CTRL N	14		ʌCTRL N	142
	CTRL O	15		ʌCTRL O	143
	CTRL P	16		ʌCTRL P	144
	CTRL Q	17		ʌCTRL Q	145
	CTRL R	18		ʌCTRL R	146
	CTRL S	19		ʌCTRL S	147
	CTRL T	20		ʌCTRL T	148
	CTRL U	21		ʌCTRL U	149
	CTRL V	22		ʌCTRL V	150
	CTRL W	23		ʌCTRL W	151
	CTRL X	24		ʌCTRL X	152
	CTRL Y	25		ʌCTRL Y	153
	CTRL Z	26		ʌCTRL Z	154
	ESC ESC	27		ESC SHIFT DELETE	156
	ESC CTRL -	28		ESC SHIFT INSERT	157
	ESC CTRL =	29		ESC CTRL TAB	158
	ESC CTRL +	30		ESC SHIFT TAB	159
	ESC CTRL *	31		ʌCTRL .	224
	CTRL .	96		ʌCTRL ;	251
	CTRL ;	123		ʌSHIFT =	252
|	SHIFT =	124		ESC CTRL 2	253
	ESC SHIFT CLEAR	125		ESC CTRL DELETE	254
	ESC DELETE	126		ESC CTRL INSERT	255
	ESC TAB	127			

logo

SOLVING PUZZLES WITH LOGO

LISTING 1

```
TO BIRTHDAY.PROBLEM :PEOPLE
( PR BEGIN.SOLVING :PEOPLE 365 )
END
TO BEGIN.SOLVING :EVENTS :POSSIBILITIE
S
MAKE "PROBABILITY 1
OUTPUT SOLVE :EVENTS - 1 :POSSIBILITIE
S
END
TO SOLVE :EVENTS :POSSIBILITIES
MAKE "PROBABILITY :PROBABILITY * ( :PO
SSIBILITIES - :EVENTS ) / :POSSIBILITI
ES
IF :EVENTS = 0 [OUTPUT WORD 100 * ( 1
- :PROBABILITY ) "%]
OUTPUT SOLVE :EVENTS - 1 :POSSIBILITIE
S
END
```



bonus education game

MOLE ATTACK

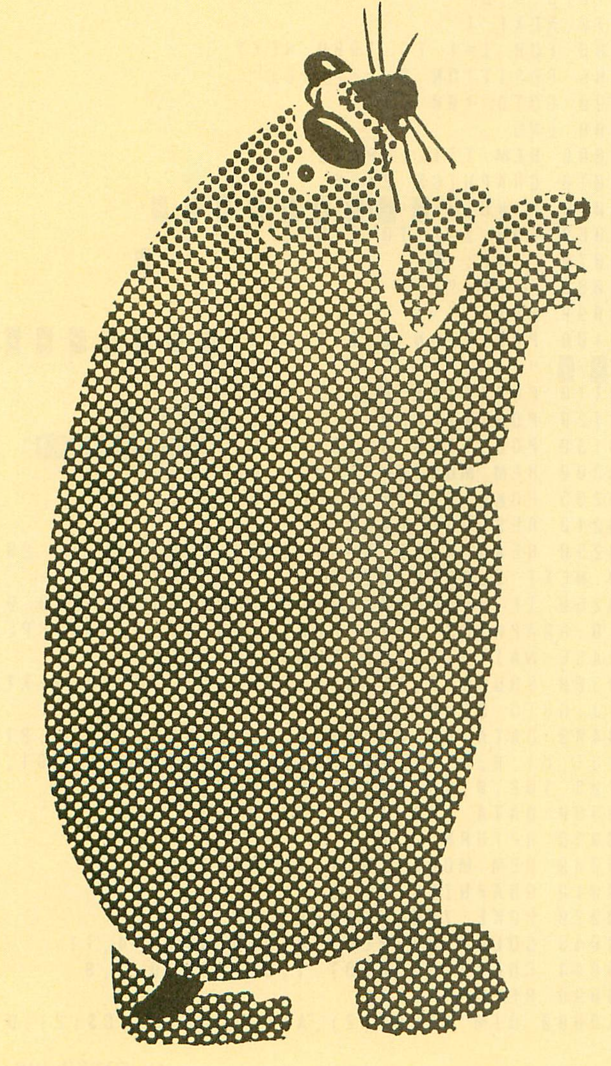
LISTING 1

```
5 REM MOLE ATTACK
6 REM BY MASHAHIRO MORI
7 REM ANTIC MAGAZINE
8 POKE 756,224
10 GOSUB 900
20 GRAPHICS 18:GOSUB 1500:POKE 756,S 2
56:GOSUB 1120:REM SET SCREEN
30 FOR A=0 TO 19:POKE SCR+A+20*1,4:POK
E SCR+A+20*10,4:NEXT A
40 FOR A=1 TO 10:POKE SCR+20*A,4:POKE
SCR+19+20*A,4:NEXT A:GOSUB 430:GOSUB 1
080
50 ML=INT(RND(1)*6):IF ML<1 OR TT=ML T
HEN 50
60 POSITION 7,4:? #6;"#":POSITION 12,4
:? #6;"#":POSITION 4,8:? #6;"#"
65 POSITION 10,8:? #6;"#":POSITION 15,
8:? #6;"#"
70 POSITION 7,2:? #6;"%":POSITION 12,2
:? #6;"%":POSITION 4,6:? #6;"%"
75 POSITION 10,6:? #6;"%":POSITION 15,
6:? #6;"%"
80 TT=ML:POSITION 0,0:? #6;"time:";TIM
EG:POSITION 10,0:? #6;"score:";SC:GOSU
B 1100
90 IF TIMEG>=SEC THEN 360
100 IF ML=1 THEN A=7:B=3:GOTO 160
110 IF ML=2 THEN A=12:B=3:GOTO 160
120 IF ML=3 THEN A=4:B=7:GOTO 160
130 IF ML=4 THEN A=10:B=7:GOTO 160
140 IF ML=5 THEN A=15:B=7:GOTO 160
150 GOTO 170
160 POSITION A,B:? #6;"█"
165 GOSUB 1500
170 FOR PA=1 TO LV*10:I=PEEK(764)
180 IF I=V1 THEN A=7:B=2:GOTO 240
190 IF I=V2 THEN A=12:B=2:GOTO 240
200 IF I=V3 THEN A=4:B=6:GOTO 240
210 IF I=V4 THEN A=10:B=6:GOTO 240
220 IF I=V5 THEN A=15:B=6:GOTO 240
230 GOSUB 1100:POSITION 0,0:? #6;"time
:";TIMEG:NEXT PA
240 POSITION A,B:? #6;CHR$(34):POKE 76
```

continued on next page

```
4,255:GOSUB 260:POSITION 7,3:? #6;A$:POSITION 4,7:? #6;A$
250 GOTO 50
260 REM CHECKING IF HIT
270 IF ML=1 AND I=V1 THEN A=7:B=3:GOTO 330
280 IF ML=2 AND I=V2 THEN A=12:B=3:GOTO 330
290 IF ML=3 AND I=V3 THEN A=4:B=7:GOTO 330
300 IF ML=4 AND I=V4 THEN A=10:B=7:GOTO 330
310 IF ML=5 AND I=V5 THEN A=15:B=7:GOTO 330
320 RETURN
330 POSITION A,B-1:? #6;"▼":POSITION A,B:? #6;CHR$(162):FOR Q=15 TO 0 STEP -1:SOUND 0,243,10,Q:SOUND 1,21,10,Q
340 NEXT Q:SC=SC+1:GOSUB 720:RETURN
350 FOR PA=1 TO W:NEXT PA:RETURN
360 REM GAME OVER
370 RESTORE 1420:POSITION 5,1:? #6;"game over":GOSUB 400
375 POSITION 4,5:? #6;"press space"
380 IF PEEK(764)=33 THEN GOSUB 1250:GOTO 20
390 POSITION 4,1:? #6;A$:POSITION 4,1:? #6;" game  over":GOTO 380
400 TRAP 410:READ AA:FOR P=1 TO 3:FOR I=15 TO 0 STEP -1:SOUND 0,AA,10,I:NEXT I:GOSUB 720:NEXT P:GOTO 400
410 FOR I=15 TO 0 STEP -1:SOUND 0,121,10,I:W=50:GOSUB 350:NEXT I:GOSUB 720
420 L=LV:SE=SEC:RETURN
430 OPEN #1,4,0,"K:":REM NEW KEYS
440 GOSUB 490:K1=A:GOSUB 490:K2=A:IF K2=K1 THEN 440
450 GOSUB 490:K3=A:IF K3=K2 OR K3=K1 THEN 450
460 GOSUB 490:K4=A:IF K4=K3 OR K4=K2 OR K4=K1 THEN 460
470 GOSUB 490:K5=A:IF K5=K4 OR K5=K3 OR K5=K2 OR K5=K1 THEN 470
480 GOTO 520
490 A=INT(RND(0)*26):A=A+97:RETURN
500 POSITION 6,4:? #6;CHR$(K1):POSITION 11,4:? #6;CHR$(K2)
510 POSITION 3,8:? #6;CHR$(K3):POSITION 9,8:? #6;CHR$(K4):POSITION 14,8:? #6;CHR$(K5):RETURN
520 POSITION 4,3:? #6;"please press":POSITION 4,4:? #6;"------------"
540 POSITION 5,6:? #6;CHR$(K1);" ";CHR$(K2);" ";CHR$(K3);" ";CHR$(K4);" ";CHR$(K5)
545 GOSUB 1500
550 GOSUB 750:V1=I:GET #1,K:IF K=K1-32 THEN 570
560 GOSUB 740:GOTO 550
570 GOSUB 730:POSITION 5,6:? #6;CHR$(K1-32)
580 GOSUB 750:V2=I:GET #1,K:IF K=K2-32 THEN 600
590 GOSUB 740:GOTO 580
600 GOSUB 730:POSITION 7,6:? #6;CHR$(K2-32)
610 GOSUB 750:V3=I:GET #1,K:IF K=K3-32 THEN 630
620 GOSUB 740:GOTO 610
630 GOSUB 730:POSITION 9,6:? #6;CHR$(K3-32)
640 GOSUB 750:V4=I:GET #1,K:IF K=K4-32 THEN 660
650 GOSUB 740:GOTO 640
660 GOSUB 730:POSITION 11,6:? #6;CHR$(K4-32)
670 GOSUB 750:V5=I:GET #1,K:IF K=K5-32 THEN 690
680 GOSUB 740:GOTO 670
690 GOSUB 730:POSITION 13,6:? #6;CHR$(K5-32)
700 POSITION 5,9:? #6;"THANK YOU":FOR PA=2 TO 6:POSITION 4,PA:? #6;A$:NEXT PA
710 W=300:GOSUB 350:POSITION 5,9:? #6;A$:CLOSE #1:GOTO 500
720 SOUND 0,0,0,0:SOUND 1,0,0,0:RETURN
730 FOR PA=15 TO 0 STEP -1:SOUND 0,121,10,PA:NEXT PA:GOSUB 720:POKE 764,255:RETURN
740 FOR Q=15 TO 0 STEP -1:SOUND 0,200,10,Q:SOUND 1,255,10,Q:NEXT Q:GOSUB 720:RETURN
750 I=PEEK(764):IF I=255 THEN 750
760 RETURN
770 REM  REDEFINE CHARACTERS
780 S=(PEEK(106)+1)*256
790 FOR M=0 TO 1023:POKE 755,KK:POKE S+M,PEEK(57344+M):IF K1<6 THEN 820
800 IF KK=2 THEN KK=3:K1=0:NEXT M:GOTO 830
810 IF KK=3 THEN KK=2:K1=0:NEXT M:GOTO 830
820 K1=K1+1:NEXT M
830 AA=0:RESTORE 1390
840 AA=AA+8:IF AA>40 THEN 1140
850 FOR I=0 TO 7:READ V:POKE AA+S+I,V:NEXT I:GOTO 840
890 REM PRESENTATION
900 DIM NAME$(20),H$(15),A$(12):A$="            ":POKE 106,PEEK(106)-5
905 GRAPHICS 0:POKE 709,2:POKE 710,12
910 NW=1:POKE 752,1:FOR U=1 TO 21:FOR PA=0 TO 2:POKE 53279,0:NEXT PA
920 POSITION 12,U:? "M.MORI":POSITION 12,U-1:? A$
930 POSITION 19,22-U:? "PRESENTS":POSITION 19,22-U+1:? A$
940 IF U=11 THEN W=250:GOSUB 350
950 NEXT U:POSITION 12,21:? A$:POSITION 19,1:? A$
960 FOR U=1 TO 22:FOR PA=0 TO 2:POKE 53279,0:NEXT PA:POSITION 14,U:? "MOLE ATTACK":POSITION 14,U-1:? A$
970 IF U=11 THEN W=250:GOSUB 350
980 NEXT U:X=1
1050 W=200:GOSUB 350:V=10:H$=" MOLE ATTACK "
1060 L=LEN(H$):T=18-L 2:FOR A=1 TO L:FOR B=22 TO V STEP -1
1065 POSITION T+A,B:PRINT H$(A,A);:POSITION T+A,B+1:? " ";:NEXT B:NEXT A:V=V+2:IF V>12 THEN KK=2:K1=0:GOTO 780
1070 H$=" INITIALIZING  ":GOTO 1060
```

```
1080 REM START TIME
1090 TIME1=INT(((PEEK(18)*65536)+(PEEK
(19)*256)+PEEK(20)) 60):RETURN
1100 REM ELAPSED TIME
1110 NOW=INT(((PEEK(18)*65536)+(PEEK(1
9)*256)+PEEK(20)) 60):TIMEG=NOW-TIME1:
RETURN
1120 SCR=PEEK(88)+256*PEEK(89):RETURN
1130 REM CARTOON
1140 DIM AA$(40):GRAPHICS 18:POKE 756,
S 256:POKE 710,132
1150 READ AA,AA$:IF AA=-1 THEN 1220
1160 AB=LEN(AA$):IF AB 2<>INT(AB 2) TH
EN AA$(AB+1)=" ":AB=AB+1
1170 FOR AC=1 TO AB 2:POSITION 10-AC,A
A:? #6;AA$(1,AC);AA$(AB-AC+1):W=30:GOS
UB 350:NEXT AC:GOTO 1150
1220 READ MUSIC:IF MUSIC=-1 THEN 1250
1230 W=10:GOSUB 350
1240 FOR VOL=15 TO 0 STEP -1:SOUND 0,M
USIC,10,VOL:SOUND 1,MUSIC+1,10,VOL:NEX
T VOL:GOTO 1220
1250 GRAPHICS 17:POKE 87,0:POSITION 0,
3:? "level":? " 1:HARD  10:EASY":? "⇒
";
1251 GOSUB 1500:TRAP 1252:INPUT LV:GOT
O 1255
1252 ? "⊠";:GOTO 1250
1255 IF (LV<>INT(LV)) OR ((LV<1) OR (L
V>10)) THEN ? "⊠";:GOTO 1250
1260 GOSUB 1280
1270 GRAPHICS 17:POKE 87,0:POSITION 0,
3:TRAP 1274:? "seconds:":? "     TO COM
PLETE    ":? "   ⇒";
1271 GOSUB 1500:INPUT SEC
1272 IF SEC>=0 THEN 1279
1274 ? "⊠":GOTO 1270
1279 GOSUB 1280:GOTO 1300
1280 FOR Q=15 TO 0 STEP -1:SOUND 0,121
,10,Q:W=20:GOSUB 350:NEXT Q:RETURN
1290 REM HI-SCORE INPUT
1300 GRAPHICS 17:POKE 87,0
1310 IF NW=1 THEN NW=0:RETURN
1320 IF SC>HSC THEN HSC=SC:? "name:";:
GOSUB 1500:INPUT NAME$:HLV=L:HSEC=SE
1330 GRAPHICS 17:POKE 756,S 256:POSITI
ON 2,2:? #6;"TODAY'S HI-SCORE":POSITIO
N 2,3:? #6;"----------------"
1340 FOR I=0 TO 22:POSITION 0,I:? #6;"
S":POSITION 19,I:? #6;"$":NEXT I
1350 FOR I=0 TO 19:POSITION I,0:? #6;"
S":POSITION I,22:? #6;"$":NEXT I
1360 POSITION 4,5:? #6;"hi-score=";HSC
:POSITION 4,7:? #6;"level=";HLV:POSITI
ON 4,9:? #6;"seconds=";HSEC
1370 POSITION 4,11:? #6;"by=";NAME$
1380 W=1500:GOSUB 350:SC=0:TIMEG=0:TIM
E1=0:RETURN
1390 DATA 126,195,129,165,129,165,153,
195,248,112,255,112,248,112,248,0,0,12
0,134,129,129,97,30,0
1400 DATA 255,255,255,255,255,255,255,
255,248,112,255,112,248,0,0,0
1405 DATA 0,MOLE ATTACK,1,------------
-,2,! ⊟ MOLE,4,    " ⊟ HAMMER,6,# ⊟ HOL
E,8,CHaRACTeRS,10,by M.MORI,-1,A
1410 DATA 121,108,96,81,81,72,81,96,12
1,108,96,96,108,121,108,121,108,121,10
8,121,121,121,-1
1420 DATA 121,96,81,96,121
1500 DSBL=PEEK(16)-128:IF DSBL<0 THEN
RETURN
1510 POKE 16,DSBL:POKE 53774,DSBL:RETU
RN
```



TYPO TABLE

Variable checksum = 1161562

Line num range		Code	Length
5	- 60	MY	501
65	- 120	BC	502
130	- 230	AY	459
240	- 330	DW	571
340	- 410	YG	526
420	- 520	ON	565
540	- 640	RE	536
650	- 730	NW	549
740	- 850	CZ	526
890	- 960	VU	571
970	- 1110	MW	526
1120	- 1250	FN	570
1251	- 1300	QN	456
1310	- 1360	YN	501
1370	- 1500	PZ	515
1510	- 1510	VV	30

PLUS MINUS

LISTING 1

```
1 REM PLUS(+) MINUS(-)
2 REM BY WALTER BULAWA
3 REM ANTIC MAGAZINE
5 GOSUB 8000
10 GOSUB 10000:REM INITIALIZATION
20 GOSUB 9000
100 REM **SELECT UPPER NUMBER
110 A=INT(15*RND(0))
140 REM **SELECT ANSWER
144 C=INT(15*RND(0))
160 REM **CALCULATE MIDDLE NUMBER
166 IF C>A THEN 180
170 B=A-C:S=2
172 GOTO 190
180 B=C-A:S=1
190 REM **MAKE STRINGS OF A,B,C VALS
192 A$=STR$(A):B$=STR$(B):C$=STR$(C)
194 LA=LEN(A$):LB=LEN(B$):LC=LEN(C$)
200 REM **SELECT OBJECT TO DISPLAY
208 II=INT(4*NOBJS*RND(0))+3
210 ICHAR=ASC(CHNEW$(II,II))
220 REM **PRINT PROBLEM TO SCREEN
222 FOR I=5 TO 9 STEP 2:POSITION 1,I:?
 #6;"    ":POSITION 5,I:? #6;BLANKS$:NE
XT I
224 POSITION 5,10:? #6;BLANKS$
230 POSITION 3-LA+1,5:? #6;A$
231 REM ** DISPLAY OBJECTS NEAR VALUE
232 IF A<=0 THEN 240
233 POSITION 5,5:FOR I=1 TO A:? #6;CHR
$(ICHAR);:SOUND 0,20,12,6:FOR D=1 TO 5
0:NEXT D:SOUND 0,0,0,0:NEXT I
240 POSITION 3-LB+1,7:? #6;B$
242 IF B<=0 THEN 260
243 POSITION 5,7:FOR I=1 TO B:? #6;CHR
$(ICHAR);:SOUND 0,20,12,6:FOR D=1 TO 5
0:NEXT D:SOUND 0,0,0,0:NEXT I
260 POSITION 1,7:? #6;SIGN$(S,S)
280 POSITION 11,1:? #6;"?"
300 REM ** GET ANSWER FROM KEYBOARD
305 D$=C$:NC=0
310 OPEN #1,4,0,"K:":GOSUB 20000
330 GET #1,I:X$=CHR$(I)
332 CLOSE #1
338 REM ** SEE IF INPUT MATCHES ANSWER
 STRING INTEGERS
339 IF X$=" " THEN 354
340 FOR I=1 TO LC
344 IF X$(1,1)=D$(I,I) THEN NC=NC+1:PO
P :GOTO 360
350 NEXT I
352 REM ** NO MATCH - WRONG INPUT
354 FOR I=50 TO 200:SOUND 0,I,14,6:NEX
T I:SOUND 0,0,0,0
356 GOTO 310
359 REM ** DISPLAY CORRECT INPUT
360 D$(I,I)=" ":POSITION 3-LC+I,9:? #6
;X$
370 IF NC<LC THEN 310
400 REM ** CORRECT ANSWER FOUND
425 POSITION 8,1:? #6;"correct"
450 FOR I=1 TO 10:FOR N=200 TO 50 STEP
 -4:SOUND 0,N,10,6:NEXT N:SETCOLOR 1,I
*4,6:NEXT I:SOUND 0,0,0,0
453 SETCOLOR 1,12,10
454 IF C=0 THEN 480
456 REM ** MOVE IN OBJECTS FROM RIGHT
458 D$(1,1)=CHR$(ICHAR):D$(2,2)=" "
460 FOR I=1 TO C:CPOS=5+I-1
461 II=NOBJS*4+2+I
462 D2$(1,1)=CHNEW$(II,II):D2$(2,2)="
"
464 FOR N=18 TO CPOS STEP -1
466 POSITION N,9:? #6;D$:POSITION N,10
:? #6;D2$:SOUND 1,10*N,10,4:FOR J=1 TO
 (CPOS-4)*3+15
467 NEXT J:NEXT N
468 SOUND 1,0,0,0
469 FOR N=1 TO 50:NEXT N:FOR N=50 TO 0
 STEP -2:SOUND 0,40,10,N 4:NEXT N:SOUN
D 0,0,0,0
470 NEXT I
480 FOR I=1 TO 1000:NEXT I
485 POSITION 8,1:? #6;"         "
490 GOTO 100
500 END
8000 REM TITLE PAGE
8010 GRAPHICS 2+16
8050 ? #6;"+-+-+-+-+-+-+-+-+-+"
8060 FOR I=2 TO 8 STEP 2
8070 ? #6;"-                 -"
8080 ? #6;"+                 +"
8090 NEXT I
8100 POSITION 0,8:? #6;"+-+-+-+-+-+-+-
+-+-+"
8110 POSITION 4,2:? #6;"PLUS +"
8120 POSITION 9,5:? #6;"MINUS -"
8130 POSITION 4,10:? #6;"press start"
8200 REM MUSIC*SCHOOL DAYS**
8205 POKE 53279,8:GOSUB 20000
8210 RESTORE 8400
8250 READ X:IF X=-1 THEN FOR J=1 TO 20
0:NEXT J:GOTO 8210
8260 IF PEEK(53279)=6 THEN SOUND 2,0,0
,0:GRAPHICS 2+16:POSITION 4,5:? #6;"PL
EASE WAIT":GOSUB 20000:RETURN
8300 SOUND 2,X,10,8:FOR J=1 TO 20:NEXT
 J:GOTO 8250
8400 DATA 60,60,60,0,0,72,72,72,0,0,81
,81,81,0,0,91,91,91,0,0,81,81,0,91,91,
108,108,0,96,96,91,91,0,0,0
8500 DATA 121,121,121,0,-1
8999 RETURN
9000 REM MORE INITIALIZATION
9010 GRAPHICS 2+16
9020 POKE 756,CHBASE/256
9040 COLOR 33:PLOT 4,2:DRAWTO 4,11
9044 COLOR 35:PLOT 1,8:DRAWTO 3,8
9099 RETURN
10000 DIM SIGN$(2),A$(2),B$(2),C$(2),D
```

```
S(2),X$(1),CHNEW$(60),D2$(2)
10002 DIM BLANKS$(15)
10010 FOR I=1 TO 15:BLANKS$(I,I)=CHR$(
0):NEXT I
10012 SIGN$="+-"
10014 CHNEW$="!#ABXDYFGHIJKABXDYFGHIJK
abxdyfghijkabxdyfghijk$%&'()*,. :;<="
10020 MEMTOP=PEEK(106)*256
10030 CHBASE=MEMTOP-2048
10040 REM ** GET ORIGINAL CHARS
10042 FOR I=0 TO 511:POKE CHBASE+I,PEE
K(57344+I):NEXT I
10050 REM ** DEFINE NEW CHARACTERS
10060 NOBJS=11
10062 RESTORE 10102
10064 FOR I=1 TO NOBJS+2:CHADD=CHBASE+
(ASC(CHNEW$(I,I))-32)*8
10066 FOR J=0 TO 7:READ N:POKE CHADD+J
,N:NEXT J:NEXT I
10079 REM ** DEFINE MINI-NUMBER SET
10080 FOR I=1 TO 14:II=4*NOBJS+2+I:CHA
DD=CHBASE+(ASC(CHNEW$(II,II))-32)*8
10082 FOR J=0 TO 7:READ N:POKE CHADD+J
,N:NEXT J:NEXT I
10102 DATA 20,20,20,20,20,20,20,20
10103 DATA 0,0,255,255,0,0,0,0
10104 DATA 60,36,36,126,90,126,36,0
10105 DATA 36,66,90,126,126,90,66,0
10106 DATA 56,108,124,16,24,16,24,0
10107 DATA 0,16,56,124,124,254,8,0
10108 DATA 24,24,60,126,126,106,110,0
10109 DATA 0,254,138,142,138,142,254,2
54
10110 DATA 0,4,9,127,16,8,4,0
10111 DATA 2,114,254,188,254,114,2,0
10113 DATA 24,24,94,24,24,88,120,0
10114 DATA 0,102,0,24,66,60,0,0
10115 DATA 32,96,33,62,62,34,34,0
10150 DATA 0,8,8,8,8,8,8,0
10152 DATA 0,24,36,4,8,16,60,0
10154 DATA 0,24,36,12,4,36,24,0
10156 DATA 0,36,36,60,4,4,4,0
10158 DATA 0,60,32,56,4,4,56,0
10160 DATA 0,24,32,32,60,36,60,0
10162 DATA 0,60,4,8,16,32,32,0
10164 DATA 0,60,36,60,36,36,60,0
10166 DATA 0,60,36,60,4,4,4,0
10168 DATA 0,94,82,82,82,82,94,0
10170 DATA 0,36,36,36,36,36,36,0
10172 DATA 0,76,82,66,68,72,94,0
10174 DATA 0,76,82,70,66,82,76,0
10176 DATA 0,82,82,94,66,66,66,0
10200 RETURN
19000 REM DISABLE BREAK KEY
20000 DSBL=PEEK(16)-128:IF DSBL<0 THEN
 RETURN
20010 POKE 16,DSBL:POKE 53774,DSBL:RET
URN
```

TYPO TABLE

Variable checksum = 747826

Line num range		Code	Length
1	- 166	AH	274
170	- 224	LA	395
230	- 260	VZ	504
280	- 352	RS	358
354	- 456	IN	508
458	- 480	YB	525
485	- 8110	GA	339
8120	- 8400	SI	507
8500	- 10012	NK	369
10014	- 10080	IO	458
10082	- 10113	MS	367
10114	- 10168	DI	305
10170	- 20010	YC	208

player/missile graphics how-to

PROGRAM THE BOUNCING BALL

LISTING 1

```
10 REM *** BOUNCING BALL 1 PROGRAM ***
20 REM                        Example 8
30 REM
40 REM Program to demonstrate Player-M
issile Graphics using string manipulat
ion
50 REM Copyright (C) 1982 by David Fox
 and Mitchell Waite
60 REM
70 DIM PLR0$(128):GOTO 140:REM This MU
ST be the first variable in the progra
m
80 REM
100 REM Hi/Lo Byte Calculation
110 HIBYTE=INT(X 256):REM Calculate Hi
gh Byte
120 LOBYTE=X-HIBYTE*256:REM Calculate
Low Byte
130 RETURN
```

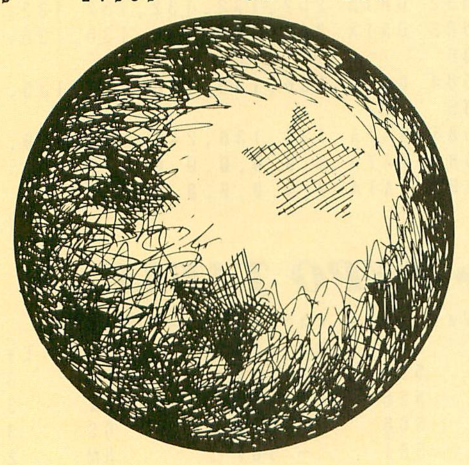
continued on next page

```
140 REM Initialize
150 DIM BLANK$(128),PLR(3),HPLR(3)
160 BLANK$(1)=CHR$(0):BLANK$(128)=CHR$(0):BLANK$(2)=BLANK$:REM Fill with blanks
170 GRAPHICS 3:POKE 752,1:PRINT "One moment please...":REM Turn off cursor, print message
190 GOSUB 5000:REM Set up memory locations
220 GOSUB 7000:REM Set up Player area
230 GOSUB 9000:REM Point PLR0$ to Player 0 RAM
240 GOSUB 10000:REM Read frames into RAM
295 REM +
300 ? "↖          *** BOUNCING BALL DEMO ***"
305 REM +
310 VEL=70:ELASTIC=0.8
320 PRINT "Initial velocity: ";VEL:PRINT "Elasticity: ";ELASTIC;
330 REM
400 REM Main Animation Loop
410 BOTTOM=91:XPOS=40:TIME=0.5:HORIZ=0.75
420 GOSUB 700:REM Move Player off screen
430 IF ELASTIC<=0.1 THEN SNDFLAG=1
440 YPOS=BOTTOM-(VEL*TIME-16*TIME*TIME):FRMNO=1
450 IF YPOS>82 AND VEL>30 THEN FRMNO=2
460 IF YPOS>=BOTTOM THEN YPOS=BOTTOM:VEL=VEL*ELASTIC:TIME=0:FRMNO=1:IF VEL>14 THEN FRMNO=3
470 IF XPOS>220 OR YPOS<=1 THEN 600
480 POKE HPLR(0),XPOS
490 FRAME$=FRAMEMEM$((FRMNO-1)*FRMSIZE+1,FRMNO*FRMSIZE):REM Select correct frame
500 BUFFER$=BLANK$:REM Fill Buffer with blanks
510 BUFFER$(YPOS,YPOS+FRMSIZE-1)=FRAME$:REM Move current frame into buffer
520 PLR0$=BUFFER$:REM Move buffer into Player 0 RAM
530 XPOS=XPOS+HORIZ
540 IF YPOS=BOTTOM AND (VEL+SNDFLAG>0.5) THEN SOUND 1,250,10,14:SNDFLAG=0:SOUND 1,0,0,0
550 IF VEL>0.5 THEN TIME=TIME+0.15:GOTO 440
560 HORIZ=HORIZ-0.01:IF HORIZ>0 THEN FRMNO=1:GOTO 470
570 REM
600 REM Get Parameters for Ball
610 GOSUB 700
620 POKE 752,0:REM Turn on cursor
630 PRINT "↖Enter initial velocity: ";
640 TRAP 630:INPUT VEL
650 PRINT "Enter the ball's elasticity (a number":PRINT "  from 0-1 [or more]): ";
660 INPUT ELASTIC
670 POKE 752,1:PRINT " ";:REM Turn off cursor
680 TRAP 40000:GOTO 400
690 REM
700 REM Move Player 0 to Left of Screen
710 POKE HPLR(0),0
730 RETURN
740 REM
5000 REM Set Up Memory Locations
5100 READ FRAMES,FRMSIZE,NUMPLRS
5120 PLRFRMMEM=FRAMES*FRMSIZE
5130 FRAMEMEM=PLRFRMMEM*NUMPLRS
5170 DIM BUFFER$(128),FRAME$(FRMSIZE),FRAMEMEM$(FRAMEMEM)
5360 RETURN
5370 REM
7000 REM Initialize Player-Missile Graphics
7010 TEMP=PEEK(106)-8:REM Set aside Player-Missile area
7020 POKE 54279,TEMP:REM Tell ANTIC where PM RAM is
7030 PMBASE=256*TEMP:REM Find PM Base address
7040 FOR I=0 TO 3
7050 PLR(I)=PMBASE+128*I+512:REM Set addresses of Players
7060 HPLR(I)=53248+I:REM Horizontal Player Position registers
7070 NEXT I
7080 POKE 559,42:REM Set PM 2 line resolution, Players enabled
7090 POKE 704,12*16+8:REM Color ball green
7100 POKE 53277,2:REM Enable Player display
7120 RETURN
7130 REM
9000 REM Point PLR0$ to Player 0 RAM
9010 STARP=PEEK(140)+PEEK(141)*256:REM Start of String Array area
9020 VVTP=PEEK(134)+PEEK(135)*256:REM Start of Variable Value Table
9030 OFFSET=PLR(0)-STARP:REM Calculate offset from String Array to Player 0
9040 X=OFFSET:GOSUB 110
9050 POKE VVTP+2,LOBYTE:REM Poke offset of string into Variable Value Table
9060 POKE VVTP+3,HIBYTE:REM This points the first string (PLR0$) to PLR(0)
9070 RETURN
9080 REM
10000 REM Read in Frame Data
10090 FOR J=1 TO PLRFRMMEM
10100 READ BYTE
10110 FRAMEMEM$(J,J)=CHR$(BYTE)
10120 NEXT J
10130 RETURN
10140 REM
20000 REM FRAME DATA
20030 REM
20040 REM Number of Frames, Frame Size, Number of Players
20050 REM .  (Bouncing Ball)
20060 DATA 3,7,1
21000 REM Frame Data for Bouncing Ball
21010 REM Frame 1
21020 DATA 0,60,126,126,126,60,0
21030 REM Frame 2
21040 DATA 24,60,60,60,60,60,24
21050 REM Frame 3
```

```
21060 DATA 0,0,0,126,255,126,0
```

TYPO TABLE

```
Variable checksum = 2026941
     Line num range      Code   Length
     10     - 130         EH     417
     140    - 310         ZT     461
     320    - 490         QM     452
     500    - 630         HO     457
     640    - 5100        AJ     286
     5120   - 7060        AK     381
     7070   - 9050        EF     508
     9060   - 20030       PM     184
     20040  - 21060       OM     239
```



What is a TYPO TABLE?

If you're new to ANTIC, you may be curious about the "TYPO TABLE" that appears at the end of most of our BASIC listings. TYPO is a program that helps you find the typing errors you make when entering programs from ANTIC. It produces a table of values that can be used to pinpoint the program segment where a line was entered incorrectly. The TYPO article and program listing appeared in the February 1984 issue of ANTIC ("TYPO," page 42) in our new listing format, and with improved instructions. It originally appeared in our August 1982 issue.

powerful animation menu-screen

ANTIC 4/5 EDITOR/ANIMATOR

LISTING 1

```
5 REM ANIMATE
10 GOSUB 80
12 RAM=PEEK(106):P1=256*(RAM-11)
20 FOR I=1536 TO 1650
22 READ A:POKE I,A:NEXT I
24 POKE 1543,RAM-16:POKE 1599,RAM-20
30 FOR I=P1 TO P1+87
32 READ A:POKE I,A:NEXT I
70 POKE 712,80
72 RUN "D:MAKESETS.BAS"
80 REM **** TITLE SCREEN
82 GRAPHICS 18:POKE 712,18
84 ? #6;"     A N T I C 4 5"
86 ? #6:? #6;"        editor"
88 ? #6:? #6;"      ANIMATOR"
90 ? #6:? #6;"           b y"
92 ? #6:? #6;"      paul chabot"
94 ? #6:? #6;"      (C)1984"
96 RETURN
100 REM **** DLI0 ....1536
102 DATA 72,169,22,141,0,2,169,144
104 DATA 141,9,212,141,10,212,173,255,
6
106 DATA 141,26,208,104,64
110 REM **** DLI1 ....1558
112 DATA 72,169,56,141,0,2,169,224
114 DATA 141,9,212,141,10,212,173,253,
6
116 DATA 141,23,208,173,254,6,141,24,2
```

continued on next page

```
08
118 DATA 173,200,2,141,26,208,104,64
120 REM **** DLI2 ....1592
122 DATA 72,169,90,141,0,2,169,140
124 DATA 141,9,212,141,10,212,173,197,
2
126 DATA 141,23,208,173,198,2,141,24,2
08
128 DATA 173,255,6,141,26,208,104,64
130 REM **** DLI3 ....1626
132 DATA 72,169,0,141,0,2,141,10,212
134 DATA 173,200,2,141,26,208,104,64
140 REM **** VBI ....1643
142 DATA 169,0,141,0,2,76,95,228
150 REM **** ...1651
200 REM **** IO .... P1=256*(RAM-11)
202 DATA 169,64,133,212,169,3,133,213
204 DATA 104,104,104,10,10,10,10,170
206 DATA 216,24,105,9,168,104,145,212
208 DATA 136,104,145,212,136,136,136
210 DATA 104,145,212,136,104,145,212
212 DATA 136,136,104,104,145,212
214 DATA 76,86,228
220 REM **** COPY ....P1+47
222 DATA 104,104,104,168,104,133,213
224 DATA 104,133,212,104,133,215,104
226 DATA 133,214,136,177,212,145,214
228 DATA 152,208,248,96
230 REM **** RT2 ....P1+72
232 DATA 104,104,133,213,104,133,212
234 DATA 70,212,70,212,41,3,133,203,96
240 REM **** P1+88
```

TYPO TABLE

Variable checksum = 78359

Line num range		Code	Length
5	- 82	CV	284
84	- 110	WP	394
112	- 134	CH	388
140	- 220	VS	340
222	- 240	GK	227

28

LISTING 2

```
500 REM MAKESETS.BAS
502 RAM=PEEK(106):P1=256*(RAM-11)
504 COPY=P1+47:IO=P1:SAV=11
506 CHW=256*(RAM-16):ROM=256*224
510 FOR I=0 TO 3
512 J=USR(COPY,256,ROM+256*I,CHW+256*I
)
514 NEXT I
516 OPEN #1,8,0,"D:ROM.SET"
518 I=USR(IO,1,1024,CHW,SAV):CLOSE #1
520 L=CHW+512
522 FOR I=0 TO 3:T=85*I
524 FOR J=0 TO 3:B=85*J
526 FOR K=0 TO 3:POKE L,T:L=L+1:NEXT K
528 FOR K=0 TO 3:POKE L,B:L=L+1:NEXT K
530 NEXT J:NEXT I
532 L=CHW+640:RESTORE 570
534 FOR I=0 TO 79
536 READ J:POKE L+I,J:NEXT I
538 L=CHW+960
540 FOR I=0 TO 63
542 READ J:POKE L+I,J:NEXT I
560 OPEN #1,8,0,"D:ANTED.SET"
562 I=USR(IO,1,1024,CHW,SAV):CLOSE #1
564 GRAPHICS 0
566 LOAD "D:ANIMATE.BAS"
570 DATA 60,195,195,195,195,195,60,0
571 DATA 12,60,12,12,12,12,63,0
572 DATA 60,195,3,3,12,148,255,0
573 DATA 255,3,12,60,3,195,60,0
574 DATA 192,204,204,204,255,12,12,0
575 DATA 255,195,192,252,3,195,60,0
576 DATA 60,192,192,252,195,195,60,0
577 DATA 255,195,12,12,48,48,192,0
578 DATA 60,195,195,60,195,195,60,0
579 DATA 63,195,195,63,3,3,3,0
580 DATA 0,0,0,0,16,56,124,68
581 DATA 68,198,198,198,198,68,68,68
582 DATA 252,132,132,132,132,252,0,0
583 DATA 248,248,136,136,136,136,136,1
36
584 DATA 136,136,136,136,136,136,136,1
36
585 DATA 136,136,248,248,0,0,0,0
586 DATA 0,0,0,0,0,0,0,0
587 DATA 0,0,0,0,0,0,0,0
```

TYPO TABLE

Variable checksum = 191014

Line num range		Code	Length
500	- 524	MM	392
526	- 564	HY	333
566	- 580	OS	353
581	- 587	HM	211

LISTING 3

```
1 REM ANTIC 4/5 EDITOR
2 REM BY PAUL CHABOT
3 REM ANTIC MAGAZINE
8 GOSUB 2100:GOSUB 2900
10 REM **** MAIN LOOP ****
12 POSITION 0,16:? "        <other> - tog
gle colors         ";
14 GOSUB 100:I=PEEK(764):POKE 764,255
16 GOSUB S(I):GOSUB 2100:GOTO 12
18 REM **********************
20 REM **** FILL GRID FROM EW ****
22 K=EW:FOR I=0 TO 8 STEP 4:FOR J=0 TO
 14 STEP 2
24 L=PEEK(K):M=PEEK(K+1):K=K+2
26 FOR N=3 TO 0 STEP -1:X=I+N
28 L=USR(RT2,L):T=PEEK(203):M=USR(RT2,
M):B=PEEK(203)
30 G(X,J)=T:G(X,J+1)=B:POKE SP(X,J),CU
(T,B):NEXT N
32 NEXT J:NEXT I
34 RETURN
40 REM **** FILL EW FROM G(*,*) ****
42 K=EW:FOR I=0 TO 8 STEP 4:FOR J=0 TO
 15
44 POKE K,64*G(I,J)+16*G(I+1,J)+4*G(I+
2,J)+G(I+3,J)
46 K=K+1:NEXT J:NEXT I
48 GOSUB 90:RETURN
80 REM **** UPDATE AN,FN ****
82 POSITION 34,11:? AN;
84 POSITION 37,11:? FN;:IF FN<10 THEN
```

```
? "  ";
86 RETURN
9Ø REM **** FILL AW,A(AN),F(FN) FROM E
W
92 I=USR(COPY,48,EW,AW)
94 I=USR(COPY,48,EW,A(AN))
96 I=USR(COPY,48,EW,F(FN))
98 RETURN
1ØØ REM **** GRID CURSOR ****
1Ø1 POKE 179Ø,82:POKE 712,114
1Ø8 H=GX:V=GY
11Ø POKE 53256,Ø:POKE 53248,GH(H)
112 POKE 53279,Ø:GX=H:GY=V
114 I=USR(COPY,6,GC,GV(V))
116 IF PEEK(764)<64 THEN 19Ø
117 IF STRIG(Ø)=1 THEN F=1
118 IF STRIG(Ø)=Ø THEN GOSUB 15Ø
12Ø ST=STICK(Ø):IF ST=15 THEN 116
122 IF ST=13 OR ST=14 THEN 13Ø
124 IF ST=11 OR ST=7 THEN 14Ø
126 GOTO 116
13Ø I=USR(COPY,6,BLNK,GV(V))
132 V=V+(ST=13)-(ST=14):IF V<Ø THEN V=
15
134 IF V>15 THEN V=Ø
136 GOTO 112
14Ø H=H+(ST=7)-(ST=11):IF H<Ø THEN H=1
1
142 IF H>11 THEN H=Ø
144 POKE 53248,GH(H):GOTO 112
15Ø REM **** TRIGGER PRESSED
152 BN=(GX>3)+(GX>7):BN=16*BN+GY
154 M=CC*(G(GX,GY)=Ø):I=SP(GX,GY)
155 IF F=Ø THEN M=CC
156 IF M2(GY) THEN 162
158 J=CU(M,G(GX,GY+1))
16Ø GOTO 164
162 J=CU(G(GX,GY-1),M)
164 POKE I,J:G(GX,GY)=M
166 J=Ø:IF GX>3 THEN J=J+4:IF GX>7 THE
N J=J+4
168 I=64*G(J,GY)+16*G(J+1,GY)+4*G(J+2,
GY)+G(J+3,GY)
17Ø POKE EW+BN,I:POKE F(FN)+BN,I
172 POKE A(AN)+BN,I
182 F=Ø:RETURN
19Ø REM **** KEY PRESSED
192 I=USR(COPY,6,BLNK,GV(V))
194 RETURN
2ØØ REM **** FN CURSOR ****
2Ø1 POKE 179Ø,34:POKE 712,196
2Ø2 POKE 53256,3
2Ø4 H=FN:V=(H>9):IF H>9 THEN H=H-1Ø
2Ø6 POKE 53248,FH(H)
2Ø8 I=USR(COPY,2Ø,FC,FV(V))
21Ø POKE 53279,Ø:J=H+1Ø*(V=1)
212 I=USR(COPY,48,F(J),AW)
214 IF PEEK(764)<64 THEN POKE 764,255:
POP :GOTO 25Ø
216 IF STRIG(Ø)=Ø THEN FN=J:GOTO 25Ø
218 ST=STICK(Ø):IF ST=15 THEN 214
22Ø IF ST=13 OR ST=14 THEN 23Ø
222 IF ST=11 OR ST=7 THEN 24Ø
224 GOTO 214
23Ø I=USR(COPY,2Ø,BLNK,FV(V)):V=1-V
232 I=USR(COPY,2Ø,FC,FV(V)):GOTO 21Ø
24Ø H=H+(ST=7)-(ST=11):IF H<Ø THEN H=9
242 IF H>9 THEN H=Ø
244 POKE 53248,FH(H):GOTO 21Ø
25Ø I=USR(COPY,2Ø,BLNK,FV(V))
254 RETURN
3ØØ REM **** AN CURSOR ****
3Ø1 POKE 179Ø,21Ø:POKE 712,36
3Ø2 AN=AN+1:IF AN>9 THEN AN=Ø
3Ø4 POKE 53256,1:V=(AN>4)
3Ø6 IF STRIG(Ø)=Ø THEN 3Ø6
31Ø I=USR(COPY,12,BLNK,AV(V))
312 POKE 53248,AH(AN):V=(AN>4)
314 I=USR(COPY,12,AC,AV(V))
316 IF STRIG(Ø)=Ø THEN 33Ø
318 ST=STICK(Ø):IF ST<>7 AND ST<>11 TH
EN 316
32Ø AN=AN+(ST=7)-(ST=11):IF AN<Ø THEN
AN=9
322 IF AN>9 THEN AN=Ø
324 POKE 53279,Ø
326 GOTO 31Ø
33Ø I=USR(COPY,12,BLNK,AV(V))
334 RETURN
1ØØØ REM **** UP ........<->..S(14)
1ØØ1 POKE 712,196
1ØØ2 FOR I=Ø TO 11:FOR J=Ø TO 12 STEP
2
1ØØ4 T=G(I,J+1):B=G(I,J+2):G(I,J)=T:G(
I,J+1)=B:POKE SP(I,J),CU(T,B):NEXT J
1ØØ6 T=G(I,15):B=Ø:G(I,14)=T:G(I,15)=B
:POKE SP(I,14),CU(T,B):NEXT I
1ØØ8 GOSUB 4Ø:RETURN
1Ø2Ø REM **** DOWN ......<=>..S(15)
1Ø21 POKE 712,196
1Ø22 FOR I=Ø TO 11:FOR J=14 TO 2 STEP
-2
1Ø24 B=G(I,J-1):T=G(I,J-2):G(I,J)=B:G(
I,J-1)=T:POKE SP(I,J),CU(T,B):NEXT J
1Ø26 T=Ø:B=G(I,Ø):G(I,Ø)=T:G(I,1)=B:PO
KE SP(I,Ø),CU(T,B):NEXT I
1Ø28 GOSUB 4Ø:RETURN
1Ø4Ø REM **** LEFT ......<+>..S(6)
1Ø41 POKE 712,196
1Ø42 FOR J=Ø TO 14 STEP 2:FOR I=Ø TO 1
Ø
1Ø44 T=G(I+1,J):B=G(I+1,J+1):G(I,J)=T:
G(I,J+1)=B:POKE SP(I,J),CU(T,B):NEXT I
1Ø46 G(11,J)=Ø:G(11,J+1)=Ø:POKE SP(11,
J),64:NEXT J
1Ø48 GOSUB 4Ø:RETURN
1Ø6Ø REM **** RIGHT .....<*>..S(7)
1Ø61 POKE 712,196
1Ø62 FOR J=Ø TO 14 STEP 2:FOR I=11 TO
1 STEP -1
1Ø64 T=G(I-1,J):B=G(I-1,J+1):G(I,J)=T:
G(I,J+1)=B:POKE SP(I,J),CU(T,B):NEXT I
1Ø66 G(Ø,J)=Ø:G(Ø,J+1)=Ø:POKE SP(Ø,J),
64:NEXT J
1Ø68 GOSUB 4Ø:RETURN
1Ø8Ø REM **** EDIT ......<A>..S(63)
1Ø81 POSITION 3,16:? " <trig>-select F
N     <key>-ABORT ";
1Ø82 GOSUB 2ØØ:GOSUB 8Ø
1Ø84 I=USR(COPY,48,F(FN),EW)
1Ø85 POSITION 3,16:? "  <trig> - selec
t AN position █";
1Ø86 GOSUB 3ØØ:GOSUB 8Ø:GOSUB 9Ø
1Ø88 GOSUB 2Ø:RETURN
1Ø9Ø REM **** NEXT ......<B>..S(21)
```

continued on next page

```
1092 FN=FN+1:IF FN>19 THEN FN=0
1094 AN=AN+1:IF AN>9 THEN AN=0
1096 GOSUB 90:GOSUB 80
1098 RETURN
1100 REM **** SAVE ......<C>..S(18)
1101 POKE 1790,18:POKE 712,82
1102 GOSUB 1180:POSITION 24,10:? "    S
A V E "
1104 POSITION 2,16:? " INPUT filename
                  ";
1105 POKE 83,28
1106 POSITION 18,16:INPUT D$
1107 POKE 83,39
1108 F$="D:":F$(3)=D$:F$(LEN(F$)+1)=".
2X3"
1110 POSITION 2,16:? "  <S> - to SAVE
";F$;
1112 IF PEEK(764)>63 THEN 1112
1114 IF PEEK(764)<>62 THEN 1122
1116 OPEN #1,8,0,F$:POKE 1913,80
1118 I=USR(IO,1,1024,CHE,SAV)
1120 CLOSE #1:POKE 1913,87
1122 POKE 54286,192:POKE 764,255
1124 GOSUB 3750:GOSUB 3700
1126 GOSUB 80
```

```
1190 IF LEN(D$)=16 THEN 1194
1192 ? " ";D$(3,10);:NEXT L:? :NEXT K
1194 CLOSE #1:POKE 54286,192
1196 POKE 82,0:RETURN
1200 REM **** ANIMATE ...<F>..S(56)
1201 POKE 1790,50:POKE 712,18
1202 POSITION 2,16:? " <N>-Next <trig>
-cont. <other>-QUIT ";
1204 J=0
1206 I=USR(COPY,48,A(J),AW):POKE 53279
,0
1207 POSITION 34,11:? J;
1208 J=J+1:IF J>AL THEN J=0
1210 K=PEEK(764):IF K<64 THEN POKE 764
,255:GOTO 1216
1212 IF STRIG(0)=0 THEN 1206
1214 GOTO 1210
1216 IF K=35 THEN 1206
1218 GOSUB 90:GOSUB 80:RETURN
1220 REM **** INC AL ....<G>..S(61)
1222 K=SA+3+3*AL
1224 IF AL>4 THEN K=SA+163+3*(AL-5)
1226 POKE K,64
1228 AL=AL+1:IF AL>9 THEN AL=0
1230 K=SA+3+3*AL:IF AL>4 THEN K=SA+163
```

```
where ? █";
1368 T=FN:GOSUB 200:L=FN:FN=T
1370 I=USR(COPY,48,A(K),F(L))
1372 GOSUB 90:RETURN
1378 RETURN
1400 REM **** COLOR .....<0>..S(8)
1401 POKE 1790,194:POKE 712,20
1402 GOSUB 1460
1408 H=0:V=0
1410 POKE 53279,0
1412 POSITION 11+4*H,11+V:? "*";
1414 IF PEEK(764)<64 THEN 1430
1415 IF STRIG(0)=0 THEN 1440
1416 ST=STICK(0):IF ST=15 THEN 1414
1418 POSITION 11+4*H,11+V:? " ";
1420 IF ST=7 OR ST=11 THEN H=1-H:GOTO
1410
1422 V=V+(ST=13)-(ST=14):IF V>5 THEN V
=0
1424 IF V<0 THEN V=5
1426 GOTO 1410
1430 K=PEEK(764):POKE 764,255
1432 IF K=40 THEN 1450
1436 GOSUB 3700:RETURN
1440 L=C(V,H)+1+H:IF L>15 THEN L=0
1442 ? L;" ";:C(V,H)=L
1444 POKE CR(V),16*C(V,0)+C(V,1)
1446 GOTO 1410
1450 POSITION 11+4*H,11+V:? " ";
1452 GOSUB 3440:GOSUB 1480:GOTO 1410
1460 REM *** COLOR MENU ****
1462 POKE 82,1:POSITION 1,10
1464 ? "           Hue Lum
█"
1466 ? "█ Color 0          █ <trigger>
- "
1468 ? "█ Color 1          █         Inc
"
1470 ? "█ Color 2          █ <R> - Rese
t "
1472 ? "█ Color 3          █ <other> -
"
1474 ? "█ Menu             █       Retur
n "
1476 ? "█ Border           █  C O L O R
█";
1478 GOSUB 1480:RETURN
1480 REM **** PUT COLOR VALUES ****
1482 POKE 82,12:POSITION 12,11
1484 FOR I=0 TO 5:FOR J=0 TO 1
1486 POSITION 12+4*J,11+I:? C(I,J);" "
;:NEXT J:NEXT I
1488 POKE 82,0:RETURN
2000 REM **** UNUSED KEYS GO HERE
2002 CC=CC+1:IF CC>3 THEN CC=1
2004 I=USR(COPY,8,CU+40*CC,CB)
2006 FOR I=100 TO 0 STEP -20
2008 SOUND 0,I,10,4:NEXT I
2010 SOUND 0,0,0,0:RETURN
2011 RETURN
2100 REM **** DISABLE BREAK ****
2102 I=PEEK(16)-128:IF I<0 THEN RETURN
2104 POKE 16,I:POKE 53774,I:RETURN
2800 REM **** OPENING SCENARIO ****
2810 TRAP 4200:OPEN #1,4,0,"D:HYPNO.2X
3"
2812 I=USR(IO,1,1024,CHE,LOD):CLOSE #1
:TRAP 4200
2814 POKE 54286,192
2816 POSITION 4,16:? "    <any key> - t
o BEGIN    ";
2824 K=USR(COPY,48,F(18-I),EW)
2826 IF PEEK(764)<64 THEN 2850
2828 NEXT I:NEXT J
2830 FOR J=1 TO 10:FOR I=0 TO 4
2832 K=USR(COPY,48,F(I),AW)
2834 K=USR(COPY,48,AW,EW)
2836 IF PEEK(764)<64 THEN 2850
2838 NEXT I:NEXT J
2840 GOTO 2820
2850 POKE 764,255:K=CHB+32
2852 FOR I=0 TO 19
2854 J=USR(COPY,48,K,F(I))
2856 K=K+48:NEXT I
2858 RETURN
2900 REM **** INITIALIZE CONTROL
2902 GRAPHICS 0
2904 POSITION 5,13:? "  I N I T I A L
I Z I N G  ";
2906 GOSUB 2100:TRAP 4000
2910 GOSUB 3200
2912 GOSUB 3100
2914 GOSUB 3300
2916 GOSUB 3400
2918 GOSUB 3000
2920 GOSUB 3500
2922 GOSUB 3600
2924 CC=3:GOSUB 2000
2930 GOSUB 2800
2970 TRAP 4100
2980 FN=0:AN=0:AL=9
2982 I=USR(COPY,48,F(FN),EW)
2984 GOSUB 80:GOSUB 90:GOSUB 20
2990 RETURN
3000 REM **** PMG SETUP
3002 I=USR(COPY,256,SA,P0)
3004 I=USR(COPY,256,SA,P2)
3006 I=USR(COPY,256,SA,P3)
3010 POKE 54279,RAM-16
3012 POKE 53277,2:POKE 559,58:POKE 623
,34
3014 POKE 53256,0:POKE 53257,0
3016 POKE 53258,3:POKE 53259,3
3020 POKE 53250,136:POKE 53251,152
3030 K=P2+26:M=170
3032 FOR I=0 TO 15:K=K+4:L=K+256
3034 POKE K,M:POKE L,M
3036 M=255-M:NEXT I
3038 POKE K-28,255:POKE L-28,255
3040 POKE K-61,255:POKE L-61,255
3042 POKE K+4,255:POKE L+4,255
3090 RETURN
3100 REM **** DLIST FIX
3110 RESTORE 3150:POKE 559,0
3114 POKE 560,0:POKE 561,RAM-4
3120 FOR I=DL TO DL+36
3122 READ J:POKE I,J:NEXT I
3124 POKE DL+5,PEEK(88):POKE DL+6,PEEK
(89)
3126 POKE DL+36,RAM-4
3130 POKE 512,0:POKE 513,6
3132 POKE 559,34:POKE 54286,192
3150 DATA 112,112,176,16,68,64,156
3152 DATA 4,4,4,4,4,4,4,16,5,5,144
3154 DATA 2,16,2,2,2,2,2,16,130,16
```

continued on next page

```
3156 DATA 4,4,16,4,4,144,65,0,156
3160 REM **** TURN ON VBI
3162 DIM A$(11)
3164 FOR I=1 TO 11:READ J
3166 A$(I,I)=CHR$(J):NEXT I
3168 A=USR(ADR(A$))
3170 RETURN
3172 DATA 162,6,160,107,169,6,32,92,22
8,104,96
3200 REM **** DIMS + FIXED VARIABLES
3204 DIM C(5,1),CR(5)
3208 DIM CU(3,3),SP(11,15),M2(15)
3210 DIM F$(15),D$(18)
3212 DIM S(63),F(19),A(9)
3214 DIM GH(11),GV(15),FH(9),FV(1)
3216 DIM G(11,15),AH(9),AV(1)
3220 RAM=PEEK(106):SA=PEEK(88)+256*PEE
K(89)
3224 CHB=(RAM-8)*256:CHE=(RAM-20)*256
3226 J=CHE+32:FOR I=0 TO 19:F(I)=J:J=J
+48:NEXT I
3228 CHW=(RAM-16)*256
3230 J=CHW+32:FOR I=0 TO 9:A(I)=J:J=J+
48:NEXT I
3232 CU=CHW+512
3234 AW=CHW+720:EW=AW+48:CB=EW+48
3236 GC=EW+208:FC=GC+8:BLNK=FC+20
3238 AC=GC-12
3240 P0=(RAM-12)*256
3242 P1=P0+256:P2=P1+256:P3=P2+256
3244 J=P0+29:FOR I=0 TO 15:GV(I)=J:J=J
+4:NEXT I
3246 J=135:FOR I=0 TO 11:GH(I)=J:J=J+4
:NEXT I
3248 FV(0)=P0+190:FV(1)=FV(0)+18
3250 J=48:FOR I=0 TO 9:FH(I)=J:J=J+16:
NEXT I
3252 AV(0)=P0+26:AV(1)=AV(0)+32
3254 J=51:FOR I=0 TO 4:AH(I)=J:AH(I+5)
=J:J=J+12:NEXT I
3256 J=0:FOR I=0 TO 15:M2(I)=J:J=1-J:N
EXT I
3258 M=64:FOR J=0 TO 3:FOR I=0 TO 3
3260 CU(J,I)=M:M=M+1:NEXT I:NEXT J
3262 K=SA+22:FOR J=0 TO 14 STEP 2
3264 FOR I=0 TO 11:SP(I,J)=K+I:SP(I,J+
1)=K+I:NEXT I
3266 K=K+40:NEXT J
3268 CR(0)=1791:CR(1)=708:CR(2)=709:CR
(3)=710:CR(4)=1790:CR(5)=712
3270 IO=P1:LOD=7:SAV=11:COPY=P1+47
3272 RT2=P1+72
3280 DL=(RAM-4)*256
3290 RETURN
3300 REM **** LOAD CHARSETS
3310 F$="D:ANTED.SET":CLOSE #1
3312 OPEN #1,4,0,F$
3314 A=USR(IO,1,1024,CHW,LOD)
3316 CLOSE #1:F$="D:ROM.SET"
3318 OPEN #1,4,0,F$
3320 A=USR(IO,1,1024,CHB,LOD)
3322 CLOSE #1:OPEN #1,4,0,F$
3324 A=USR(IO,1,1024,CHE,LOD)
3326 CLOSE #1:OPEN #1,4,0,F$
3328 A=USR(IO,1,512,CHW,LOD)
3330 CLOSE #1
3340 POKE 54286,192
3350 RETURN
3400 REM **** FIX COLORS
3410 POKE 1789,PEEK(709)
3412 POKE 1790,PEEK(710)
3414 POKE 1791,PEEK(712)
3416 POKE 712,48
3418 POKE 704,30
3420 POKE 706,200
3422 POKE 707,120
3428 GOSUB 3440
3430 RETURN
3440 REM **** RESET COLORS ****
3442 RESTORE 3446
3444 FOR I=0 TO 5:FOR J=0 TO 1:READ K:
C(I,J)=K:NEXT J:NEXT I
3446 DATA 0,0,4,8,8,4,1,10,12,2,1,4
3450 FOR I=0 TO 5
3452 POKE CR(I),16*C(I,0)+C(I,1):NEXT
I
3454 RETURN
3500 REM **** LINKAGE
3510 FOR I=0 TO 63:S(I)=2000:NEXT I
3512 S(14)=1000:S(15)=1020:S(6)=1040
3514 S(7)=1060:S(63)=1080:S(21)=1090
3516 S(18)=1100:S(58)=1130:S(42)=1170
3518 S(56)=1200:S(61)=1220:S(57)=1240
3520 S(13)=1260:S(1)=1280:S(5)=1300
3522 S(0)=1320:S(37)=1340:S(35)=1360
3524 S(8)=1400
3550 RETURN
3600 REM **** FILL SCREEN
3602 POKE 752,1:POKE 82,0
3610 SA=PEEK(88)+256*PEEK(89)
3612 K=SA+41:J=0
3614 FOR I=4 TO 32 STEP 2:L=K+J
3616 POKE L,I:POKE L+40,I+1
3618 POKE L+160,I+30:POKE L+200,I+31
3620 J=J+1:NEXT I
3622 K=SA+681:J=0
3624 FOR I=4 TO 62 STEP 2:L=K+J
3626 POKE L,I:POKE L+40,I+1
3628 POKE L+80,I+60:POKE L+120,I+61
3630 J=J+1:IF J=3 THEN K=K+4:J=0
3632 NEXT I
3634 K=SA+2:L=K+160
3636 FOR I=0 TO 4:POKE K,80+I:POKE L,8
5+I
3638 K=K+3:L=L+3:NEXT I
3640 K=SA+321:L=K+40:J=4
3642 FOR I=0 TO 29:POKE K+I,J:J=J+1
3644 POKE L+I,J:J=J+1:NEXT I
3646 K=SA+17:L=K+40:J=90
3648 FOR I=0 TO 2:POKE K+I,J:POKE K+80
+I,J
3650 POKE K+200+I,J:POKE K+335+I,J:J=J
+1
3652 POKE L+I,J:POKE L+80+I,J:POKE L+2
00+I,J
3654 POKE L+335+I,J:J=J+1:NEXT I
3656 K=SA+36:L=K+40:J=96
3658 FOR I=0 TO 2:POKE K+I,J:POKE K+80
+I,J
3660 POKE K+200+I,J:POKE K+320+I,J:J=J
+1
3662 POKE L+I,J:POKE L+80+I,J:POKE L+2
00+I,J
3664 POKE L+320+I,J:J=J+1:NEXT I
3666 K=SA+21:L=K+13
3668 FOR I=0 TO 7:POKE K,102:POKE L,10
```

```
2
3670 K=K+40:L=L+40:NEXT I
3672 K=SA+281:L=K+6:M=L+6
3674 FOR I=0 TO 2:POKE K+I,65
3676 POKE L+I,66:POKE M+I,67:NEXT I
3678 POKE SA+175,69
3682 GOSUB 3750:GOSUB 3700
3684 RETURN
3700 REM **** MAIN MENU ****
3702 POSITION 0,10
3710 ? "  0  1  2  3  4  5  6  7  8  9
     "
3712 ? " A Edit  F Animate  K Copy to
"
3714 ? " B Next  G Inc AL  L Exchang
e "
3716 ? " C Save  H Clear  M Swap
"
3718 ? " D Load  I Clear S  N AN to F
ig "
3720 ? " E TopL  J Restore  O Colors
"
3722 ? "
     "
3748 RETURN
3750 REM **** RIGHT EDGE MENU ****
3752 POKE 82,33:POSITION 33,10
3760 ? " AN FN"
3762 ? " ▌    "
3764 ? "      "
3766 ? "      ":POKE SA+556,220
3768 ? "      ":POKE SA+595,222:POKE S
A+597,223
3770 ? "      ":POKE SA+636,221
3772 ? "      "
3782 POKE 82,0
3784 K=SA+439
3786 FOR I=0 TO 6:POKE K,128:K=K+40:NE
XT I
3788 RETURN
4000 REM **** START-UP TRAP ****
4002 POKE 764,255
4010 GRAPHICS 0:POKE 710,194:POKE 752,
1
4012 ? :? "      START-UP   ERROR "
4014 ? :? "  ANIMATE.BAS must be RUN f
irst"
4016 ? :? "  <any>-to try AGAIN"
4020 IF PEEK(764)=255 THEN 4020
4022 POKE 764,255
4024 RUN
4100 REM **** MISC TRAP ****
4102 POKE 764,255
4110 POKE 54286,192:POKE 712,4:TRAP 41
00
4112 POSITION 2,16:? "     UNKNOWN   E
RROR     ";
4114 POSITION 2,10:? "<any> - to attem
pt RECOVERY ";
4116 GOTO 4250
4200 REM **** I/O TRAP ****
4202 POKE 764,255
4204 POKE 1790,50:POKE 712,4
4210 CLOSE #1:POKE 1913,87:TRAP 4100
4212 POKE 54286,192
4214 POSITION 2,16:? "   I/O  ERROR
";
4216 POSITION 2,10:? "<any> - to RECO
VER";
4250 I=PEEK(712)+2:IF I>14 THEN I=4
4252 POKE 712,I:IF PEEK(764)=255 THEN
4250
4254 POKE 764,255
4256 GOSUB 3700:GOSUB 3750:GOSUB 80
4258 RETURN
```

TYPO TABLE

Variable checksum = 1574118

Line num range			Code	Length
1	-	24	PB	417
26	-	82	TT	435
84	-	112	DE	323
114	-	136	KA	370
140	-	164	TV	348
166	-	204	RX	395
206	-	232	WC	409
240	-	312	GO	380
314	-	1002	AY	362
1004	-	1028	HP	503
1040	-	1064	IU	513
1066	-	1094	EI	465
1096	-	1112	NK	400
1114	-	1134	UZ	366
1136	-	1154	JC	507
1156	-	1181	NU	375
1182	-	1202	QV	536
1204	-	1224	SU	381
1226	-	1264	WA	463
1266	-	1324	IN	420
1326	-	1362	QT	374
1364	-	1412	YF	337
1414	-	1440	WK	411
1442	-	1472	LO	417
1474	-	2006	LJ	427
2008	-	2820	QM	437
2822	-	2852	RJ	321
2854	-	2918	KR	237
2920	-	3004	GF	250
3006	-	3040	JS	423
3042	-	3150	DI	359
3152	-	3204	WM	306
3208	-	3234	GG	534
3236	-	3254	SM	517
3256	-	3280	NQ	500
3290	-	3328	MG	370
3330	-	3428	NN	231
3430	-	3514	AO	413
3516	-	3616	YY	491
3618	-	3640	UW	436
3642	-	3664	PW	512
3666	-	3710	XV	369
3712	-	3764	VU	364
3766	-	4012	QG	365
4014	-	4200	SC	371
4202	-	4258	AI	366

LISTING 4

```
30 REM HYPNO.BAS
40 DIM H$(2),ARRAY$(96),HOLD$(1024),HE
X$(23),FILE$(20):HEX$="@ABCDEFGHI#####
##JKLMNO":CASS=0:Q=1
70 ? "↖PLEASE WAIT....":FOR D=1 TO 500
:NEXT D:POKE 559,0
130 RESTORE 2000:FOR LINE=2000 TO 2220
 STEP 10:GOSUB 140:NEXT LINE:GOTO 190
140 READ ARRAY$,LSUM:FOR HNUM=1 TO LEN
(ARRAY$) STEP 2:H$=ARRAY$(HNUM,HNUM+1)
150 D=0:FOR I=1 TO 2:D=D*16+ASC(HEX$(A
SC(H$(I))-47))-64:NEXT I
155 SUM=SUM+(ASC(H$(1,1))+ASC(H$(2,2))
):HOLD$(Q,Q)=CHR$(D):Q=Q+1:NEXT HNUM
160 CL=PEEK(183)+PEEK(184)*256:IF CL<>
LINE THEN POKE 559,34:? "LINE ";LINE;"
 IS MISSING.":END
170 IF LSUM<>SUM THEN POKE 559,34:? "↖
BAD DATA AT LINE #";LINE:END
180 RETURN
190 POKE 559,34:? "◘↖PRESS <RETURN> TO
 SAVE THE FILE.":INPUT H$
200 CLOSE #1:OPEN #1,8,0,"D:HYPNO.2X3"
:IOCB=848:POKE IOCB+2,11
210 ADDRESS=ADR(HOLD$):ADHI=INT(ADDRES
S 256):ADLO=ADDRESS-ADHI*256
220 BYTES=LEN(HOLD$):NUMHI=INT(BYTES 2
56):NUMLO=BYTES-NUMHI*256
230 POKE IOCB+4,ADLO:POKE IOCB+5,ADHI:
POKE IOCB+8,NUMLO:POKE IOCB+9,NUMHI
240 X=USR(ADR("hhh◘LVd"),16)
250 CLOSE #1:? "↖◘ALL DONE.":END
2000 DATA 0000000000000000001818181800
1800006666660000000000066FF6666FF660000
020A2A050525A585A5270501,4664
2010 DATA 000000AABEFFAA55D7D755555FF
FF5555AAAA0080A0A850505 85A525AD8504000
0000000020A2A0525A585A525,9680
2020 DATA 070501005050BEFFAAAA55D71755
55FFC3FF5555AAAA0080A0A85050505 85A52DA
5840000000000020A2A050525,14653
2030 DATA A585A527050114 1400BEAAFFAA55
17175555FFC3C37D55AABE0080A0A850505 85A
525AD850400000000000020A2A,19649
2040 DATA 0505 0525A585A7250505 0000AAAA
FFAA5517175555FFC37F5555BEAA0080A0A850
585A525A58D050400000000000.24608
2050 DATA 020A2A0505 0525A585A72501 0000
00AAAAFFAA55D717555557DD35F5555AABE0080
A0A85050585A525AD8504000,29597
2060 DATA 00000018307E3018000000180C7E
0C1800000001 83C7E7E3C18000000 3C063E663E
00006060 7C66667C0000003C,34369
2070 DATA 6060603C000006063E66663E0000
003C667E603C00000E183E18181800000003E66
663E067C0060607C66666600,39162
2080 DATA 0018003818183C00000600060606
063C0060606C786C66000038181818183C0000
00667F7F6B630000007C6666,43905
2090 DATA 66660000003C666663C0000007C
66667C606000003E66663E060600007C666060
60000003E603C067C000018,48650
2100 DATA 7E1818180E000000666666663E00
00006666663C18000000636B7F3E3600000066
3C183C66000000666663E0C,53436
2110 DATA 7800007E0C18307E0000183C7E7E
183C0000AAAA808F8F8F8F8F8F8F80AAAA00
00AAAA00FFFF00141400FFFF,58622
2120 DATA 00AAAA0000AAAA02F2F2F2F2F2F2
F2F202AAAA00AAAA003F3F3C3C3C3C3C3C3F3F
00AAAAAAAA00FFFF00555555,63896
2130 DATA 5500FFFF00AAAAAAAA00FCFC3C3C
3C3C3C3CFCFC00AAAAAA00FFFFF0F1F1F1F1F1
F1F0FFFF00AAAA00FFFF0055,69372
2140 DATA 554141555500FFFF00AAAA00FFFF
0F4F4F4F4F4F4F0FFFFF00AA00FFFFC0C5C5C5
C5C5C5C5C5C0FFFF0000FFFF,74792
2150 DATA 0055550028280055550 0FFFF0000
FFFF03535353535353535303FFFF00FFFF0015
15141414141414151500FFFF,79736
2160 DATA FFFF00555500AAAAAAAA00555500
FFFFFFFF0054541414141414145454 00FFFFFF
0055555052525252525 25055,84776
2170 DATA 5500FFFF00555500AAAAAAAAAAAA
00555500FFFF0055550585858585850 55555
00FF0055554 04A4A4A4A4A4A,89848
2180 DATA 4A4A40555500005555 00AAAA003C
3C00AAAA0055550000555501A1A1A1A1A1A1A1
A101555500555500 2A2A2828,94718
2190 DATA 2828282 82A2A005555555500AAAA
00FFFFFFFF00AAAA005555555500A8A8282828
282828A8A80055555500AAAA,99766
2200 DATA A0A3A3A3A3A3A0AAAA00555500
AAAA00FFFFC3C3FFFF00AAAA00555500AAAA0A
CACACACACACA0AAAAA005500,105100
2210 DATA 7E0C1830607E00001E1818181 81E
0000406030180C06000078181818187800000 8
1C3663000000000000000000,109752
2220 DATA FF0018181818181818 18007E787C
6E6606000818387838180800101 81C1E1C1810
00,113399
```

LISTING 5

```
1 REM DEMO
6 GOSUB 200:GOTO 20
10 REM **** ERASE PRINT "EATER" ****
11 POSITION XO,YO:? #6;B$;
12 POSITION XO,YO+1:? #6;B$;
14 POSITION X,Y:? #6;ET$;
16 POSITION X,Y+1:? #6;EB$;
18 RETURN
20 REM **** MAIN LOOP ****
22 N=N+1:IF N>9 THEN N=0
24 I=USR(COPY,48,ES(N),EW)
26 M=M+1:IF M>4 THEN M=0
28 I=USR(COPY,48,DS(M),DW)
30 IF STRIG(0)=0 THEN GOSUB 150
40 ST=STICK(0)
42 IF ST=7 OR ST=11 THEN 50
44 IF ST=13 OR ST=14 THEN 60
46 GOTO 20
50 X=XO+(ST=7)-(ST=11):IF X<1 THEN X=1
52 IF X>36 THEN X=36
54 GOSUB 10:XO=X:GOTO 20
60 Y=Y+(ST=13)-(ST=14):IF Y<1 THEN Y=1
62 IF Y>18 THEN Y=18
64 GOSUB 10:YO=Y:GOTO 20
150 REM **** TRIGGER PRESSED ****
152 GOSUB 250
160 RETURN
200 REM **** INITIALIZE ****
202 GOSUB 300:GOSUB 400:GOSUB 500
210 DIM DT$(3),DB$(3),ET$(3),EB$(3)
212 DIM B$(3),DS(4),ES(9)
220 DT$(1)=CHR$(0):DT$(2)=CHR$(2):DT$(
```

```
3)=CHR$(4)
222 DB$(1)=CHR$(1):DB$(2)=CHR$(3):DB$(
3)=CHR$(5)
224 ET$(1)=CHR$(6):ET$(2)=CHR$(8):ET$(
3)=CHR$(10)
226 EB$(1)=CHR$(7):EB$(2)=CHR$(9):EB$(
3)=CHR$(11)
228 B$="   "
230 DW=CHW+512:EW=DW+48
232 FOR I=0 TO 4:DS(I)=CHS+512+48*I:NE
XT I
234 FOR I=0 TO 9:ES(I)=CHS+32+48*I:NEX
T I
240 FOR K=0 TO 8:GOSUB 250:NEXT K
242 X=20:Y=10:XO=20:YO=10
244 POSITION XO,YO:GOSUB 10
246 RETURN
250 REM **** PLACE A DOT ****
252 I=INT(36*RND(0))+1
254 J=INT(18*RND(0))+1
256 POSITION I,J:? #6;DT$;
258 POSITION I,J+1:? #6;DB$;
260 I=PEEK(712)+16:IF I>255 THEN I=0
262 POKE 712,I
270 RETURN
300 REM **** ANMAT.PG6 ****
302 RESTORE 330
304 FOR I=1536 TO 1607
306 READ J:POKE I,J:NEXT I
308 COPY=1536:IO=1561:LOD=7:SAV=11
310 RETURN
330 REM **** COPY.....1536
332 DATA 104,104,104,168,104,133,213
334 DATA 104,133,212,104,133,215,104
336 DATA 133,214,136,177,212,145,214
338 DATA 152,208,248,96
340 REM **** IO.......1561
342 DATA 169,64,133,212,169,3,133,213
344 DATA 104,104,104,10,10,10,10,170
346 DATA 216,24,105,9,168,104,145,212
348 DATA 136,104,145,212,136,136,136
350 DATA 104,145,212,136,104,145,212
352 DATA 136,136,104,104,145,212
354 DATA 76,86,228
360 REM **** 1608
400 REM **** LOAD CHARSETS ****
402 RAM=PEEK(106)
404 CHW=256*(RAM-8):CHS=256*(RAM-12)
410 OPEN #1,4,0,"D:ROM.SET"
412 I=USR(IO,1,1024,CHW,LOD):CLOSE #1
414 OPEN #1,4,0,"D:ROM.SET"
416 I=USR(IO,1,1024,CHS,LOD):CLOSE #1
420 RETURN
500 REM **** FIX DISPLAY LIST ****
502 GRAPHICS 0:POKE 752,1
504 ? "          ANTIC 4   ANIMATION";
506 POKE 703,4:POKE 756,RAM-8
508 DL=PEEK(560)+256*PEEK(561)
510 FOR I=6 TO 24:POKE DL+I,4:NEXT I
520 FOR I=0 TO 11:POSITION 0,I+4
522 ? #6;CHR$(I);:POSITION 39,I+4
524 ? #6;CHR$(I);:NEXT I
530 ? :? "    <trigger> - for more DOTS
"
540 POKE 708,132:POKE 709,24
542 POKE 710,82:POKE 712,8*16
550 RETURN
```

TYPO TABLE

Variable checksum = 482138

Line num range			Code	Length
1	-	26	SP	316
28	-	64	RD	384
150	-	228	CI	509
230	-	258	RC	407
260	-	334	SC	296
336	-	400	QC	332
402	-	508	UR	421
510	-	550	KJ	279

game of the month

JACKS

LISTING 1

```
10 REM JACKS
20 REM BY COY ISON
30 REM ANTIC MAGAZINE
100 GOSUB 1000:GOSUB 500:GOSUB 230:GOT
O 260
110 REM MOVE BALL
120 POKE SC+2+20*BM,0
130 CT=1:BM=BM+N
140 IF BM<1 THEN BM=1:N=+1
150 IF BM>22 THEN BM=22:PU=PU-1:GOTO 4
40
160 POKE SC+2+20*BM,250
170 SOUND 0,10+BM,14,8
180 POKE 77,0
190 RETURN
200 REM GIVE # NEEDED TO PICK UP
210 H=H+1
220 POSITION 6,4:? #6;"holding=";H
230 POSITION 6,1:? #6;"pick up=";PU
240 POSITION 6,2:? #6;"______________"
250 RETURN
260 REM JOYSTICK ROUTE
270 CT=0
280 OV=3:DO=22
290 S=STICK(0):SOUND 0,0,0,0
```

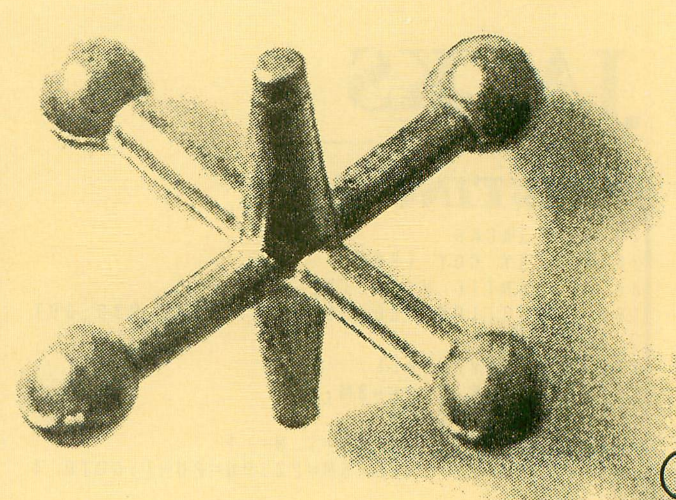
continued on next page

```
300 IF S<>15 THEN POSITION OV,DO:? #6;
" "
310 DX=(S=5 OR S=6 OR S=7)-(S=9 OR S=1
0 OR S=11)
320 DY=(S=5 OR S=9 OR S=13)-(S=6 OR S=
10 OR S=14)
330 LOCATE OV+DX,DO+DY,A
340 IF A=250 THEN 410
350 IF A=36 THEN GOSUB 200:GOTO 370
360 IF A<>32 THEN 380
370 OV=OV+DX:DO=DO+DY
380 POSITION OV,DO:? #6;"_"
390 GOSUB 120
400 GOTO 290
410 REM BALL CAUGHT, CLEAR JACKS
420 IF PU<>H THEN PU=PU-1:GOTO 440
430 PU=PU+1
440 H=0
450 IF PU<1 THEN PU=1
460 FOR LP=6 TO 20:POSITION 4,LP:? #6;
"               ":NEXT LP
465 POSITION 6,4:? #6;"          "
470 POSITION 2,BM:? #6;" "
480 POSITION OV,DO:? #6;" "
485 IF PU=8 THEN 900
490 GOSUB 230:GOSUB 650:GOTO 260
500 REM DRAW FIELD
510 H=0:PU=1:SC=PEEK(88)+256*PEEK(89)
520 FOR LP=0 TO 18:POSITION LP,23:? #6
;"█":NEXT LP
530 FOR LP=1 TO 19
540 POSITION LP,0:? #6;"█"
550 IF LP<5 THEN 570
560 POSITION LP,5:? #6;"█"
570 NEXT LP
580 FOR LP=1 TO 4
590 POSITION 5,LP:? #6;"█"
600 NEXT LP
610 FOR LP=0 TO 22
620 POSITION 0,LP:? #6;"█"
630 POSITION 19,LP:? #6;"█"
640 NEXT LP
650 REM THROW JACKS & BOUNCE BALL
660 POSITION 4,21:? #6;"HIT red BUTTON
"
670 POSITION 4,22:? #6;"TO THROW JACKS
"
680 IF STRIG(0)<>0 THEN 680
690 FOR LP=21 TO 22:POSITION 3,LP:? #6
;"                ":NEXT LP:GOSUB 750
700 POSITION 4,21:? #6;"HIT red BUTTON
"
710 POSITION 4,22:? #6;"TO BOUNCE BALL
"
720 IF STRIG(0)<>0 THEN 720
730 FOR LP=21 TO 22:POSITION 3,LP:? #6
;"                ":NEXT LP
740 RETURN
750 REM PLACE JACKS (RANDOM)
760 BM=22:N=-1
770 POSITION 2,22:? #6;"Z"
780 FOR LP=1 TO 18:POSITION LP,23:? #6
;"█":NEXT LP
790 FOR LP=1 TO 7
800 JV=INT(14*RND(1)+5):IF JV>14 THEN
800
810 JD=INT(20*RND(1)+6):IF JD>20 THEN
810
820 LOCATE JV,JD,QQ:IF QQ<>32 THEN 800
830 POSITION JV,JD:? #6;"$"
840 NEXT LP
850 RETURN
900 REM GAME OVER
920 POSITION 6,11:? #6;"game over"
930 POSITION 4,12:? #6;"play again(y/n
)"
940 IF PEEK(764)=43 THEN PU=0:GOTO 430
950 IF PEEK(764)=35 THEN END
960 GOTO 940
1000 REM FAST DUMP
1010 GRAPHICS 1+16
1020 DIM E$(50):RAMTOP=PEEK(106)-8:POK
E 106,RAMTOP:CHBAS=RAMTOP:ADDR=CHBAS*2
56:PAGE=4
1030 E$(1,41)="hh┐Oh┐Nhh┐T)♥┐L)◆┐M"┘▶ ♥
1L┌NHPyfMfOhdTPp◆♥":A=USR(ADR(E$),ADDR
,PAGE)
1040 FOR LP=1 TO 3
1050 READ CHAR
1060 POS=ADDR+(CHAR*8)
1070 FOR X=0 TO 7:READ A:POKE (POS+X),
A:NEXT X
1080 NEXT LP
1090 DATA 1,255,255,255,255,255,255,25
5,255
1100 DATA 58,0,0,56,108,84,108,56,0
1110 DATA 4,0,8,8,20,107,20,8,8
1120 POKE 756,CHBAS
1130 RETURN
```

TYPO TABLE

Variable checksum = 437763

Line num range		Code	Length
10	- 180	IC	346
190	- 300	WX	347
310	- 420	VB	370
430	- 520	UU	413
530	- 640	IO	263
650	- 760	HS	497
770	- 930	CE	404
940	- 1080	FZ	388
1090	- 1130	DV	118



bonus game

DIVER

LISTING 1

```
5 REM DIVER
6 REM BY STEVE MAY
7 REM ANTIC MAGAZINE
10 GOSUB 1500:GRAPHICS 1:GOSUB 1400:GOSUB 1000:GOSUB 1300:DV=3:OX=20:GOSUB 900:DX=9:DY=0:DV=3:DIM X(20),Y(20)
20 DIM S$(3):S$="(>)"
30 POSITION DX,DY:? #6;"@";:F6=1:GOTO 430
100 GOSUB 600:S=STICK(0)
105 IF STRIG(0)=0 THEN 400
110 IF (S=7 AND DX<19) THEN NDX=1:NDY=0:GOTO 300
120 IF (S=11 AND DX>0) THEN NDX=-1:NDY=0:GOTO 300
130 IF (S=13 AND DY<19) THEN NDX=0:NDY=1:GOTO 300
140 IF S=14 THEN NDX=0:NDY=-1:GOTO 300
200 GOTO 100
300 SOUND 0,40+DY*2.5,6,2:LOCATE DX+NDX,DY+NDY,CHR:IF CHR=32 THEN 310
303 IF CHR=234 THEN 100
305 GOTO 500
310 POSITION DX,DY:? #6;" ";:DX=DX+NDX:DY=DY+NDY:POSITION DX,DY:? #6;"@";:GOTO 100
400 LOCATE DX,DY+1,CHR:IF CHR<>234 THEN 420
410 GOSUB 3000:POSITION DX,DY+1:? #6;" ";:SC=SC+10:TC=TC+1:OB=OB+1:GOSUB 910:GOTO 100
420 IF DY<>1 THEN 100
425 SOUND 0,0,0,0
430 FOR X=1 TO 50:NEXT X:SC=SC-OX:F2=1:OC=0:OX=20:POSITION DX,DY:? #6;" ";:POSITION DX,0:? #6;"@";
431 IF F6=0 THEN GOSUB 3010
432 IF SC<0 THEN SC=0
435 F6=0:GOSUB 910:IF TC>0 THEN 460
440 GOSUB 600:IF STRIG(0)<>0 THEN 440
450 FOR X=1 TO 50:NEXT X:GOSUB 3010:POSITION DX,0:DY=1:? #6;"_";:POSITION DX,DY:? #6;"@";:F2=0:GOTO 100
460 SOUND 0,0,0,0:POSITION 0,2:? #6;"THE TREASURE CHEST";:IF TC>1 THEN ? #6;"S ";:GOTO 466
464 ? #6;"  ";
466 ? #6;"CONTAINED:":? #6
470 FOR X=1 TO TC:Y=INT(RND(0)*17):? #6;TR$(Y*10+1,Y*10+10);" ";PT(Y);" PTS.":SC=SC+PT(Y):TC=TC-1:GOSUB 910:NEXT X
475 IF OB=5 THEN 800
480 FOR X=1 TO 2000:NEXT X
490 POSITION 0,2:FOR X=0 TO 7:? #6;"                    ";:NEXT X:TC=0:GOSUB 910:GOTO 440
500 IF CHR=95 THEN 100
510 GOSUB 3020:SOUND 0,0,0,0:C=0:FOR N=1 TO 20:X(N)=0:Y(N)=0:NEXT N
520 LOCATE DX,DY+1,CHR:IF CHR=32 THEN 540
530 GOSUB 3040:FOR N=1 TO C:POSITION X(N),Y(N):? #6;" ";:NEXT N:POSITION 0,0:? #6;"_";
532 FOR N=0 TO 2:SOUND N,0,0,0:NEXT N
535 POSITION DX,DY:? #6;" ";:DX=9:DY=0:DV=DV-1:TC=0:OC=0:OX=20:F2=0:GOSUB 910:IF OB=5 THEN POSITION 0,3:GOTO 800
538 GOTO 30
540 IF DY=19 THEN 530
550 C=C+1:X(C)=DX:Y(C)=DY:POSITION DX,DY:? #6;" ";:GOSUB 3050:DY=DY+1:POSITION DX,DY:? #6;"@";
560 FOR X=1 TO 150:NEXT X:GOTO 520
570 GOTO 520
600 IF F2=1 THEN 620
610 OC=OC+1:IF OC=10 THEN OC=0:OX=OX-1:GOSUB 910:IF OX=0 THEN GOTO 510
620 IF F3=1 THEN 640
630 IF INT((RND(0)*20) (SK+1))=1 THEN F3=1:OCX=INT(RND(0)*20):OCY=4
640 IF F1=1 THEN 660
650 IF INT((RND(0)*200) (SK+1))=1 THEN F1=1:BX=INT(RND(0)*18):BY=5:TICKER=5:C2=0
660 IF F4=1 THEN 700
670 IF INT((RND(0)*OX*15) (SK+1))=1 THEN F4=1:C3=0:SX=0:SY=8
700 IF F3<>1 THEN 720
710 C1=C1+1:IF C1=ABS(3-SK) THEN C1=0:GOSUB 2000
720 IF F4=1 THEN 2300
730 IF F1=1 THEN 2200
740 RETURN
800 ? #6:? #6;"all THE treasure IS     GONE.":OB=0:CR=CR+1:IF CR=5 THEN GOTO 850
805 ? #6:? #6;"     ADVANCING TO":? #6;"     coral   reef #";CR+1;:GOTO 820
810 TC=0:OC=0:OX=20:F2=0:DX=9:DY=0:F1=0:F3=0:F4=0:RETURN
820 GOSUB 810:FOR X=1 TO 1000:NEXT X
840 GOSUB 1000:GOSUB 905:GOTO 30
850 GOSUB 810:CR=0:SK=SK+1:? #6;"YOU HAVE ADVANCED TO    SKILL  LEVEL ";SK+1;
860 IF DV<3 THEN DV=DV+1:GOTO 820
870 GOTO 820
900 DIM OX$(21),DV$(3),TC$(6):OX$=" ●●●●●●●●●●●●●●●●●●●●":DV$=" @@":TC$=" JJJJJ"
905 POKE 82,0:POKE 752,1:? CHR$(125):? CHR$(28);
910 IF DV=0 THEN GOTO 1200
920 ? "SCORE:";SC;" ";:POKE 657,23:? "HIGH SCORE:";HSC:POKE 656,1:POKE 657,0:? "DIVERS:";DV$(1,DV);" ";
930 POKE 657,12:? "TREASURE CHESTS:";TC$(1,TC+1);"      ";:POKE 656,2:POKE 657,6:? "OXYGEN:";OX$(1,OX+1);" ";
```

continued on next page

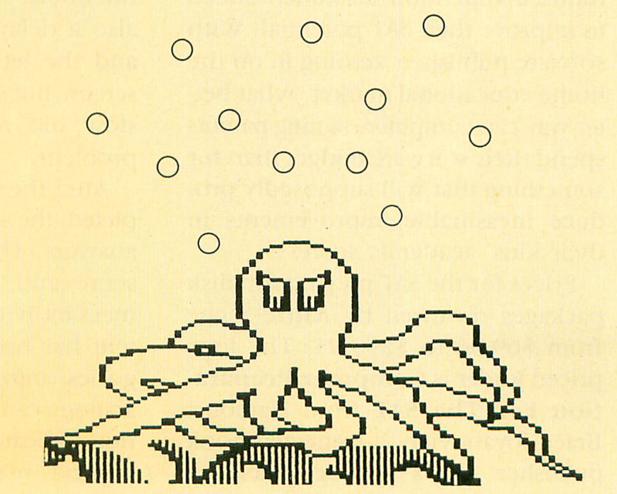
```
940 POKE 656,0:POKE 657,0:RETURN
1000 POKE 752,1:? #6;CHR$(125):? "↖":P
OKE 708,162:POKE 709,202:POKE 710,10:P
OKE 711,30:POKE 712,116
1005 POKE 756,PEEK(106)+1:POSITION 0,0
:? #6;"____________________";
1010 COLOR 43:RESTORE 1100+CR*10:READ
X1:FOR N=1 TO X1:READ Z,Y,Z1,X:PLOT Z,
Y:DRAWTO Z1,X:NEXT N
1030 COLOR 234:FOR N=1 TO 5:READ Z,Y:P
LOT Z,Y:NEXT N:READ HT:RETURN
1100 DATA 8,0,16,0,18,1,17,1,18,0,19,1
9,19,6,17,8,17,5,18,8,18,15,16,15,16,1
5,17,16,17,14,18,17,18
1102 DATA 1,16,7,16,9,18,14,17,18,18,1
6
1110 DATA 16,0,15,5,15,0,16,1,16,0,17,
0,17,5,15,5,18,4,18,4,18,0,19,2,19,7,1
9,7,18,8,19,8,17,9,19,9,14
1112 DATA 10,19,10,15,11,16,11,16
1114 DATA 11,19,19,19,15,18,19,18,16,1
7,17,17,16,16,16,16,19,17,19,14
1116 DATA 4,17,18,17,7,17,11,18,19,13,
14
1120 DATA 18,0,12,0,19,1,12,1,15,1,18,
1,19,2,12,2,13,3,12,4,12,3,15,3,19,4,1
4,4,14,4,15,6,15,4,18,4,19
1122 DATA 6,16,7,16,6,17,11,17,5,19,19
,19,16,14,16,14,15,15,16,15,14,16,15,1
6,13,17,15,17,13,18,16,18
1124 DATA 19,18,19,18,1,17,2,19,4,17,1
6,17,18,18,12
1130 DATA 25,0,15,5,15,0,16,0,18,0,19,
19,19,1,18,1,18,3,18,3,18,3,16,3,16,6,
17,6,18,7,16,7,18,8,14,8,16
1132 DATA 10,16,10,16,11,16,11,18,12,1
8,12,18,10,14,12,14,13,11,13,16,16,14,
16,17,15,13,16,13,18,11,18,18
1134 DATA 19,11,19,18,14,11,17,11,14,1
6,14,17,0,13,0,13,0,14,2,14,10,18,10,1
8,12,13,12,13,16,10,19,10
1136 DATA 1,17,6,16,8,18,13,18,15,17,1
0
1140 DATA 18,0,11,2,11,0,17,0,18,1,14,
1,14,2,12,2,17,3,12,4,12,3,13,7,13,4,1
5,4,15,4,16,5,16,5,17,6,17
1142 DATA 5,18,7,18,0,19,19,19,7,14,13
,14,7,15,9,15,8,16,9,16,9,17,10,17,12,
15,13,15,12,16,14,16,13,17,17,17
1144 DATA 1,13,0,16,4,18,5,15,10,16,11
1200 GRAPHICS 17:POSITION 5,3:? #6;"ga
me over";:POSITION 5,5:? #6;"SCORE:";S
C
1205 IF SC>HSC THEN HSC=SC
1210 SC=0:DV=3:F1=0:F2=0:F3=0:F4=0:TIC
KER=5:C=0:C1=0:C2=0:TC=0:OB=0:DX=9:DY=
0:OX=20:OC=0:C3=0:CR=0:SK=0
1220 ? #6:? #6;"PRESS START TO PLAY";
1230 IF PEEK(53279)<>6 THEN 1230
1240 GRAPHICS 1:GOSUB 1400:GOSUB 1000:
GOSUB 905:GOTO 30
1300 DIM TR$(180)
1305 TR$="GOLD BARS DIAMONDS  EMERALDS
  GOLD COINSSWORDS    SEAWEED   SAND
    TRINKETS  PEARLS    SILVER    "
1308 TR$(101)="WEAPONS   ARTIFACTS NEC
KLACES RINGS     CAPT. LOG RARE CORALD
EAD FISH "
1310 DIM PT(17):RESTORE 1320:FOR X=0 T
O 16:READ PT:PT(X)=PT:NEXT X:RETURN
1320 DATA 150,125,115,105,30,0,0,55,85
,70,40,65,75,60,15,80,10
1400 POKE 559,0:DL=PEEK(560)+PEEK(561)
*256
1410 RESTORE 1420:POKE DL+3,198:FOR A=
1 TO 5:READ B:POKE DL+B,134:NEXT A
1420 DATA 8,13,17,21,24
1430 RESTORE 1440:FOR A=1536 TO 1590:R
EAD B:POKE A,B:NEXT A
1440 DATA 72,138,72,174,49,6,142,10,21
2,224,5,240,9,189,50,6,141,26,208,76,3
5,6,169,0,141,26,208,141,24,208
1450 DATA 169,14,141,23,208,232,224,6,
208,2,162,0,142,49,6,104,170,104,64,0,
200,198,196,194,192
1460 POKE 512,0:POKE 513,6:POKE 54286,
192:POKE 559,34:RETURN
1500 POKE 106,PEEK(106)-5:GRAPHICS 0:P
OKE 752,1:START=(PEEK(106)+1)*256:Z1=1
024
1505 GRAPHICS 0:POKE 559,0:DL=PEEK(560
)+PEEK(561)*256:POKE DL+10,7:POKE DL+1
1,7:POKE DL+27,65
1510 POKE DL+28,PEEK(560):POKE DL+29,P
EEK(561):SETCOLOR 2,0,0:POKE 752,1:SET
COLOR 1,0,15:SETCOLOR 0,6,8
1520 POSITION 7,5:? "DIVER":POSITION 9
,6:? "Written & designed by":POSITION
15,7:? "Steve May"
1530 POSITION 17,8:? "1984":POSITION 7
,10:? "Initializing, please wait"
1540 POKE 559,34:GOSUB 30000
1550 POSITION 10,14:? "Press START to
play"
1560 IF PEEK(53279)<>6 THEN 1560
1570 RETURN
2000 POSITION OCX,OCY:? #6;"q";
2010 IF DY<>OCY THEN 2040
2020 IF DX<OCX THEN NOCX=-1:NOCY=0:GOT
O 2060
2030 IF DX>OCX THEN NOCX=1:NOCY=0:GOTO
 2060
2040 IF DY<OCY THEN NOCY=-1:NOCX=0:GOT
O 2060
2050 IF DY>OCY THEN NOCY=1:NOCX=0:GOTO
 2060
2060 TRAP 2090:LOCATE OCX+NOCX,OCY+NOC
Y,CHR
2070 IF CHR<>32 THEN 2100
2080 POSITION OCX,OCY:? #6;" ";:OCX=OC
X+NOCX:OCY=OCY+NOCY:POSITION OCX,OCY:?
 #6;"q";:RETURN
2090 GOTO 720
2100 IF CHR=192 AND F2=0 THEN 510
2110 NOCX=0:NOCY=0:GOTO 2080
2200 POSITION BX,BY:? #6;"!<$";:POSITI
ON BX,BY+1:? #6;"%";TICKER;"&";:POSITI
ON BX,BY+2:? #6;"'*=";
2210 C2=C2+1:IF C2<>ABS(10-(SK*2)) THE
N RETURN
2220 C2=0:TICKER=TICKER-1:SOUND 1,0,1,
15:SOUND 1,0,0,0
2230 IF TICKER=0 THEN POSITION BX+1,BY
+1:? #6;TICKER;:GOTO 2250
2240 RETURN
2250 FOR X1=10 TO 1 STEP -1:GOSUB 3030
```

```
:FOR X=0 TO 15
2252 A=X*16+14:POKE 1586,A:POKE 1587,A
:POKE 1588,A:POKE 1589,A:POKE 1590,A
2254 NEXT X:NEXT X1
2256 POKE 1586,200:POKE 1587,198:POKE
1588,196:POKE 1589,194:POKE 1590,192:S
OUND 0,0,0,0:SOUND 1,0,0,0
2260 POSITION BX,BY:? #6;"    ";:POSITI
ON BX,BY+1:? #6;"    ":POSITION BX,BY+2
:? #6;"    ";
2270 IF F3=1 THEN POSITION OCX,OCY:? #
6;" ";
2275 IF F4=1 THEN POSITION SX,SY:? #6;
"    ";:F4=0:C3=0
2280 IF F2=0 THEN F1=0:F3=0:C2=0:TICKE
R=5:GOTO 510
2290 F1=0:F3=0:C2=0:TICKER=5:RETURN
2300 POSITION SX,SY:? #6;S$;:IF F1=1 T
HEN GOSUB 2200
2310 C3=C3+1:IF ((C3=3-SK) OR (SK>2))
THEN C3=0:POSITION SX,SY:? #6;"    ";:S
X=SX+1:POSITION SX,SY:? #6;S$;
2320 IF SX=17 THEN POSITION SX,SY:? #6
;"    ";:C3=0:F4=0:RETURN
2330 IF SX<5 THEN 2400
2340 IF DY<HT AND F2=0 THEN 2360
2350 GOTO 2400
2360 COLOR 45:PLOT SX+3,SY:DRAWTO DX,D
Y:GOSUB 3060:COLOR 32:PLOT SX+3,SY:DRA
WTO DX,DY
2370 POSITION DX,DY:? #6;"@";
2380 POSITION SX,SY:? #6;"    ";:SX=SX+
1:IF SX<16 THEN ? #6;S$;:GOTO 2380
2390 POSITION SX,SY:? #6;"    ";:F4=0:
C3=0:GOTO 510
2400 RETURN
3000 FOR X=1 TO 20:SOUND 2,X,0,X:NEXT
X:SOUND 2,0,0,0:RETURN
3010 FOR X=10 TO 1 STEP -1:FOR Y=1 TO
10:NEXT Y:SOUND 0,X*1.5,0,X
3015 NEXT X:FOR Y=1 TO 25:NEXT Y:SOUND
 0,0,0,0:RETURN
3020 FOR X=1 TO 10:SOUND 0,X,6,8:SOUND
 1,200,8,14:SOUND 2,240,4,15:NEXT X:SO
UND 1,0,0,0:SOUND 2,0,0,0:RETURN
3030 SOUND 0,20,0,X1*1.5:SOUND 1,255,1
0,X1*1.5:RETURN
3040 FOR X=10 TO 1 STEP -1:SOUND 2,175
,8,X:SOUND 0,120,8,X:SOUND 1,140,8,X:S
OUND 2,170,8,X:NEXT X:RETURN
3050 FOR X=1 TO 10:SOUND 0,X*DY,10,6:N
EXT X:SOUND 0,0,0,0:RETURN
3060 FOR X=1 TO 30 STEP 3:SOUND 3,X,2,
12:NEXT X:SOUND 3,0,0,0:RETURN
30000 Z=USR(ADR("h)♥¬K¬M)✦¬N%j▟i▟¬L ♥1
M⌐KHPyfLfN%NIdPm●")):RESTORE 30100
30010 POSITION 17,12:? " ";
30030 READ X:IF X=-1 THEN RESTORE :RET
URN
30040 FOR Y=0 TO 7:READ Z:POKE X+Y+STA
RT,Z:NEXT Y:GOTO 30030
30100 DATA 8,1,0,12,7,3,119,31,15
30101 DATA 120,224,167,229,7,0,28,20,2
8
30102 DATA 32,128,0,48,224,192,238,248
,240
30103 DATA 40,222,60,60,252,252,60,60,
222
30104 DATA 48,123,60,60,63,63,60,60,12
3
30105 DATA 56,15,31,119,3,7,12,0,1
30106 DATA 80,0,195,255,255,255,126,21
9,153
30107 DATA 88,255,255,255,255,255,255,
255,255
30108 DATA 224,153,219,126,255,255,255
,195,0
30109 DATA 232,240,248,238,192,224,48,
0,128
30110 DATA 256,126,195,129,129,195,126
,102,195
30111 DATA 336,0,126,129,231,255,255,2
55,0
30112 DATA 64,0,0,0,64,63,95,7,0
30113 DATA 240,3,3,3,3,255,255,255,127
30114 DATA 392,60,106,60,84,146,146,73
,10
30115 DATA 72,128,192,192,192,255,255,
254,252
30116 DATA 992,0,0,0,0,0,48,76,131,-1
```

TYPO TABLE

Variable checksum = 1367265

Line num range			Code	Length
5	-	130	AR	513
140	-	430	UL	576
431	-	470	ZJ	594
475	-	535	SC	646
538	-	650	AA	567
660	-	810	NF	570
820	-	920	KP	525
930	-	1030	AQ	545
1100	-	1122	AQ	552
1124	-	1142	HG	581
1144	-	1240	ID	508
1300	-	1430	ZP	535
1440	-	1505	VT	502
1510	-	2020	YP	530
2030	-	2220	HY	566
2230	-	2270	CA	513
2275	-	2360	YI	554
2370	-	3020	RJ	604
3030	-	30010	NZ	515
30030	-	30109	HW	430
30110	-	30116	DO	246



RATING COMPUTER SAT PREPARATION COURSES

by GEORGE J. ADAMSON

Just about every U.S. high school senior who wants to attend college has to overcome the barrier of the Scholastic Aptitude Test (SAT). To do well on SAT, a student must develop the problem-solving skills necessary to master fairly hard verbal and math questions. How do students develop such skills and become test-wise? Repetition and practice, of course.

Because of the intense college entrance competition, all students need to improve their SAT potential. With sofware publishers zeroing in on the home educational market, what better way can computer-owning parents spend their software budget than for something that will supposedly produce measurable improvements in their kids' academic scores?

Prices for the SAT preparation disk packages reviewed by **Antic** range from $69.96 to $299.95. The low-priced leader is **Computer Preparation For The SAT** from Harcourt Brace Jovanovich, a respected book publisher. HBJ's package includes three double-sided disks, a copy of the thick text How To Prepare For The SAT, sold separately for $7.95, and a user's manual. HBJ integrates book media with a computer by letting each do what it can do best—the book for reading the practice questions and the computer for timing and scoring the results to give immediate feedback. My son found it more time-consuming to input answers via the keyboard than to blacken circles on the book's answer sheet. There was also a delay between the keystroke and the letter's appearance on the screen, but substituting BASIC XL for slow old Atari BASIC solved that problem.

After the six test sections are completed, the screen displays the correct answers. The computer then tallies scores and constructs a study plan to meet individual needs. The SAT content has been divided into 15 categories: antonyms, analogy sentences, analogy categories, sentence completion indicators, sentence completion context, reading comprehension in-

COMPUTER PREPARATION FOR THE SAT
Harcourt Brace Jovanovich
1250 Sixth Ave.
San Diego, CA 92101
toll free 1-800-543-1918
in CA (619) 699-6335
$79.95 48K disks (6)

PREPARING FOR THE SAT AND OTHER APTITUDE TESTS
Program Design, Inc.
11 Idar Court
Greenwich, CT 06830
(203) 661-8799
$59.95 16K cassettes (6)
$69.96 disks (6) with audio cassette

KRELL'S COLLEGE BOARD SAT
Krell Software Corp.
1320 Stony Brook Road
Stony Brook, NY 11790
(516) 751-5139
$299.95 48K disks (11)
$139.95 48K abridged version

ferences, comprehension facts, arithmetic problems, quantitative comparison, geometry, word problems, fraction-decimal-percent, algebraic expressions, ratio-proportion, and exponents-roots.

Performance in each category is rated as high, medium, or low study priority. The student is told which "Three Step Strategies to Success" to read in the text and which disk banks to access in order to seek improvement. There are 540 verbal and math items available in 27 banks of 20 questions each, and a timer keeps track of response time. Explanations are available immediately after the correct answer is shown. After 20 questions are answered, a summary screen not only shows number right and wrong but also the average time spent per question.

Another valuable feature is 1,000 flashcards of prefixes, roots, and suffixes in banks of 20 each. Marking the words not known while stepping through all 20 will let the computer repeat them until total familiarity is achieved.

The user's manual is easy to read and to follow except for a "boo-boo" in failing to mention that a BASIC cartridge must be inserted in an 800 or 1200XL Atari computer. (Both other programs reviewed here are very specific about that.) HBJ should print an insert to note this. But overall the program does give the buyer money's worth at about $13 per disk side. Any game disk costs more than that.

Costing about $23 per disk side, **Preparing For The SAT And Other Aptitude Tests** uses all Atari's special features: synchronized tape soundtrack narration, large text, animated graphics, color, and sound effects. The Program Design Inc. package is focused on making students test-wise to all types to aptitude and IQ tests rather than just the SAT.

Included in the package is the book MAKING THE GRADE . . . HOW TO TAKE AND PASS A TEST. The first course, with soundtrack, explains purposes of IQ and aptitude tests and suggestions for using test time more wisely and improving test scores.

Two perhaps unnecessary items are the world "FALSE" radiating a rainbow of colors on the screen long after the taped voice has announced it and the monotonous PDI animated loop appearing after each lesson.

One disk does include a timer for taking a practice SAT test, but unfortunately the package does not include such a test. Users must find their own SAT samples, type in answers, and then type in the answer key. Finally, the computer will handle all the scoring, but by now this is far more trouble than it's worth.

The vocabulary builder consists of 20 lessons of 40 words each with both synonym and antonym questions. Analogies shows common types of word relationships, and the questions are answered by recognizing the actual relationships instead of just picking "hot" as the word related to "cold" the same way "big" is to "small."

Number series (using taped narration) teaches recognition of sequences typically found on IQ tests (3, 7, 11, 15 . . . What comes next?) Quantitative comparisons run from elementary arithmetic to algebra and geometry in seven lessons reviewing the kinds of problems on standardized tests.

PDI's package may possibly be the better choice to become test-wise for a variety of standardized tests, and it's not boring, but it doesn't really offer individualized instruction. However, it is the only package with cassette users in mind.

The Cadillac of SAT programs is **Krell's College Board SAT** which at $299.95 may be beyond the budget of some Atari owners. Krell has the smallest box and the smallest manual, but the most disks (11 at an average cost of $27 per disk).

Krell notes that its purpose isn't just to promote higher SAT test scores (although its claim to fame is its 70-point increased score guarantee) but to "convey a genuine mastery of the essential verbal and mathematical skills involved. Noticeably it does not reserve computer memory space for timing answers, but it stresses individual needs. "The infinite patience and tolerance of a computerized tutor will be of particular value in assisting the underachiever," its manual points out.

Krell also includes a bonus book in its package, *The A's And B's Of Academic Scholarships* listing scholarships available at most of the nation's colleges and universities and their SAT criteria.

Krell promises to refund the purchase price if transcripts of tests taken before and after the purchase salesslip date don't show an average increase of at least 70 points. It also offers a $15 bonus certificate if one can verify an increase of 75 points or exceed 1350 total. Also, 34 winners in most improved score and highest score categories will share in the $50,000 Great American SAT contest prizes. Buyers of the $139.95 condensed version are not eligible for the 70-point warranty, however.

The complete packages consist of 42 tests. Verbal consists of eight vocabulary lessons, two on sentence completion, two on reading comprehension, and three on word relationships. Twelve standard written English tests dig into sentences and paragraphs. The 15 math lessons include not only specific math computations but also "equal to—greater than—cannot be determined" decisions.

Krell's sophisticated presentation uses artificial intelligence techniques and random selection to customize for the needs of the individual user. The automatic learning strategy continuously monitors students' performances and presents more of the kinds of problems they are having difficulty answering.

Each of these three programs appeals to a different market: the low-priced HBJ to the masses, PDI to cassette owners and those who want to survive all kinds of standardized tests Krell for those who want the most sophisticated in educational technology, regardless of cost.

George J. Adamson, a regular contributor to Antic, has been a language arts public school teacher in Pennsylvania for over 20 years. He is an avid Atari user and supporter, and is active in his local Users Group.

Graphics power in a 10-line program

Spray PAINTER

by DAVID DUBERMAN
Antic Technical Editor

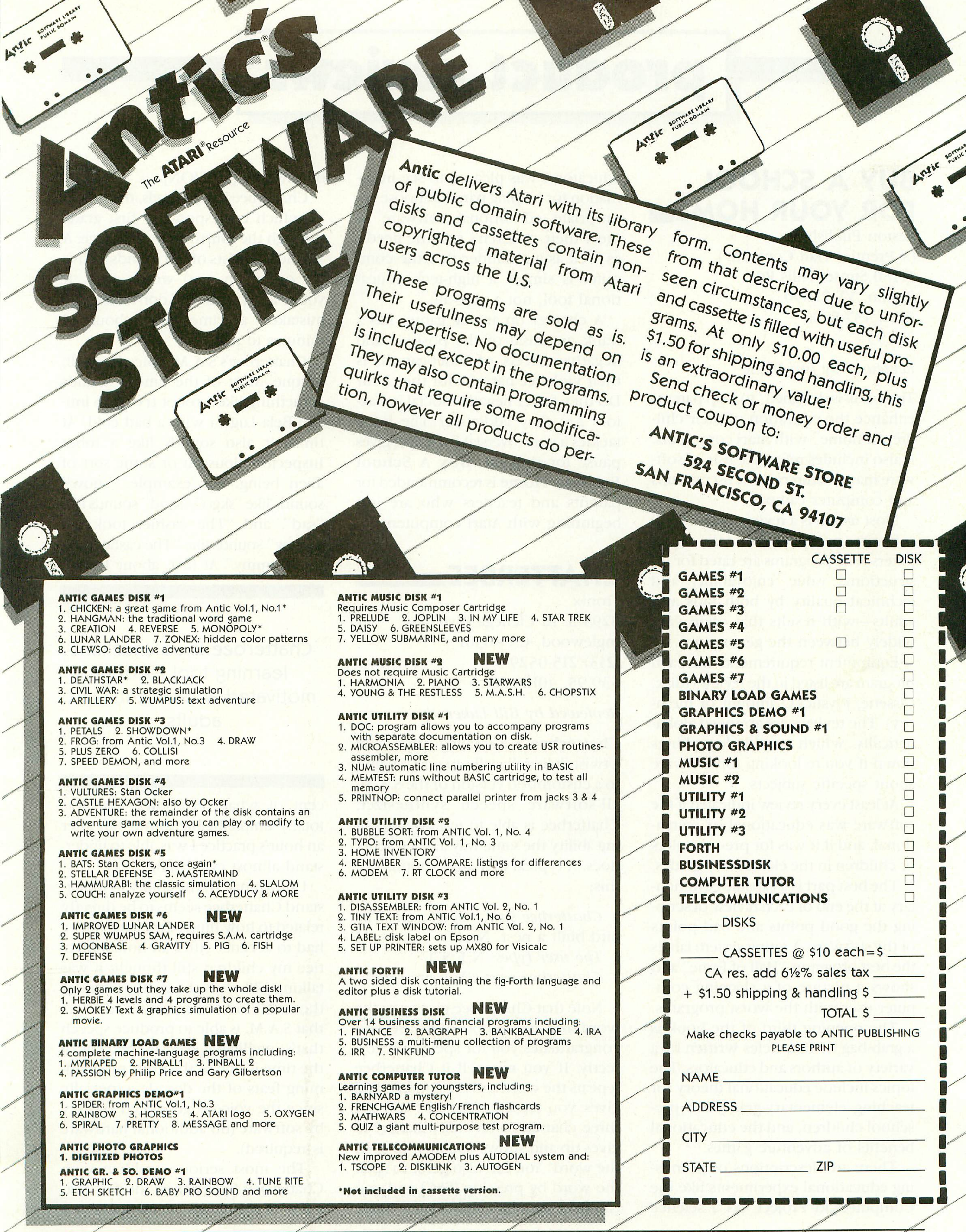
The "spray-paint can" is one of the most popular features in the MacPaint program of Apple's Macintosh computer. But your Atari can spray-paint just as well—and in colors too.

I've never seen a drawing program for the Atari that includes a spray-paint feature, so I wrote this 10-line routine. You can incorporate it into your own Graphics 8 drawing program to create finely shaded air-brush-type effects. The spray works best on a black background. It only works in GR.8 because of the lower resolution in the other graphics modes.

The program spray-paints by randomly plotting four points within a range of plus-or-minus five pixels. Continuous movement is fairly slow because eight points must be coordinated every time you move the joystick. Antic Disk subscribers RUN "D:SPRAY.BAS".

The size of the spray is controlled by the variable in line 5. To make the brush smaller, increase the value of DIV and decrease OFS. Do the opposite to make the brush larger.

```
5 DIV=25:OFS=5
10 GRAPHICS 8
11 SETCOLOR 2,0,0
15 COLOR 1:PLOT 100,100:X=100:Y=100
16 S=STICK(0):IF S=15 THEN 16
20 X=X+(S<8)*(X<313)-(S>8 AND S<13)*(X
>6)
30 Y=Y+(INT(S/4)*4=S-1)*(Y<153)-(INT(S
/2)=S/2)*(Y>6)
45 FOR I=1 TO 4:PLOT X+(INT(PEEK(53770
)/DIV)-OFS),Y+(INT(PEEK(53770)/DIV)-OF
S)
46 NEXT I
50 GOTO 16
```



Antic's
The ATARI® Resource
SOFTWARE STORE
Antic delivers Atari with its library of public domain software. These disks and cassettes contain non-copyrighted material from Atari users across the U.S.
These programs are sold as is. Their usefulness may depend on your expertise. No documentation is included except in the programs. They may also contain programming quirks that require some modification, however all products do perform. Contents may vary slightly from that described due to unforseen circumstances, but each disk and cassette is filled with useful programs. At only $10.00 each, plus $1.50 for shipping and handling, this is an extraordinary value!
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3. CIVIL WAR: a strategic simulation
4. ARTILLERY 5. WUMPUS: text adventure
ANTIC GAMES DISK #3
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5. PLUS ZERO 6. COLLISI
7. SPEED DEMON, and more
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3. HAMMURABI: the classic simulation 4. SLALOM
5. COUCH: analyze yourself 6. ACEYDUCY & MORE
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2. SUPER WUMPUS SAM, requires S.A.M. cartridge
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4. PASSION by Philip Price and Gary Gilbertson
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2. RAINBOW 3. HORSES 4. ATARI logo 5. OXYGEN
6. SPIRAL 7. PRETTY 8. MESSAGE and more
ANTIC PHOTO GRAPHICS
1. DIGITIZED PHOTOS
ANTIC GR. & SO. DEMO #1
1. GRAPHIC 2. DRAW 3. RAINBOW 4. TUNE RITE
5. ETCH SKETCH 6. BABY PRO SOUND and more
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Requires Music Composer Cartridge
1. PRELUDE 2. JOPLIN 3. IN MY LIFE 4. STAR TREK
5. DAISY 6. GREENSLEEVES
7. YELLOW SUBMARINE, and many more
ANTIC MUSIC DISK #2 NEW
Does not require Music Cartridge
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4. YOUNG & THE RESTLESS 5. M.A.S.H. 6. CHOPSTIX
ANTIC UTILITY DISK #1
1. DOC: program allows you to accompany programs with separate documentation on disk.
2. MICROASSEMBLER: allows you to create USR routines-assembler, more
3. NUM: automatic line numbering utility in BASIC
4. MEMTEST: runs without BASIC cartridge, to test all memory
5. PRINTNOP: connect parallel printer from jacks 3 & 4
ANTIC UTILITY DISK #2
1. BUBBLE SORT: from ANTIC Vol. 1, No. 4
2. TYPO: from ANTIC Vol. 1, No. 3
3. HOME INVENTORY
4. RENUMBER 5. COMPARE: listings for differences
6. MODEM 7. RT CLOCK and more
ANTIC UTILITY DISK #3
1. DISASSEMBLER: from ANTIC Vol. 2, No. 1
2. TINY TEXT: from ANTIC Vol.1, No. 6
3. GTIA TEXT WINDOW: from ANTIC Vol. 2, No. 1
4. LABEL: disk label on Epson
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product reviews

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Reston Publishing
(A Prentice-Hall Company)
11480 Sunset Hills Rd.
Reston, VA 22090
(707) 437-8900
$14.95

Reviewed by Jim Wiese

This book is designed "to help parents enhance the education of their children at home" with Atari computers. It also includes reference lists of software manufacturers, Atari user groups and computer camps.

Most useful is a review of over 100 software products for Atari computers. The programs are rated for instructional value, enjoyability and technical quality by both kids and adults—with results that often vary widely between the generations.

Equipment requirements for each program are listed in the reviews (disk, cassette, joysticks, amount of memory). The reviews are arranged alphabetically, which would slow things down if you're looking for software about specific subjects.

At least every review indicated if the software was educational or recreational, and if it was for pre-schoolers or children in the elementary grades.

The best part is a capsule commentary at the end of each review describing the good points and bad points of the software. A rating system labels the best programs "Hall of Fame" and shows a picture of a sleeping computer user with the worst programs.

The opening third of the book is a grab-bag of 10 articles written by a variety of authors and educators. The topics include educational theory for teaching elementary-grade and pre-school children, and the educational benefits of adventure games.

There are descriptions of promising educational experiments like the ComputerKid Project. As a science educator, I was pleased to see information for helping parents choose appropriate educational software to meet their children's specific needs, as well as a reminder that the computer is simply a high-tech educational tool, not a cure-all.

A chapter on arcade games has a frank appraisal of the positive and negative effects of videogames. Is their violence harmful for the child? Do they foster negative social behavior? Are they addictive? The book tackles a controversial issue and gives pause for thought. **Buy A School For Your Home** is recommended for parents and teachers who are just beginning with Atari computers.

CHATTERBEE

Tronix
8295 S. La Cienega Blvd.
Inglewood, CA 90301
(213) 215-0529
$39.95, 40K—disk

Reviewed by Bill Lukeroth

Chatterbee is a spelling game with a twist: it literally talks to you. Thanks to a customized version of the S.A.M. all-software speech synthesizer, Chatterbee is able to test your spelling ability the same way a real teacher does. A typical exchange sounds like this:

Chatterbee says, "Spell nest. The bird built a nest. Nest."
The user types: N E S T
Chatterbee says, "You are right!"

Note that Chatterbee gives you the word *and* an example of its use, and congratulates you for spelling it correctly. If you misspell it Chatterbee repeats the word and the context, and gives you another chance. You get three chances, after that Chatterbee gives up and shows you how to spell the word. You can also get it to spell the word by pressing [ESC] and you can hear the word and context again by pressing [OPTION].

Chatterbee has 25 levels, the first 16 of which correspond to first grade through the fourth year of college. A "game" consists of ten rounds of five (or optionally ten) words each. If you're a fast typist and don't make any mistakes, a game takes about 15 minutes to play.

Chatterbee's S.A.M. voice is—well, unique. Most of the time it sounds something like a robot trying to imitate Bela Lugosi with a bad cold. At times it also sounds like a robot Inspector Clouseau or some sort of alien being. For example, "snow" sounds like "skgo", "sand" sounds like "sad", and "The cashier took the money" sounds like "The casher took the mommy." At first, about 15 percent of what Chatterbee said was totally unintelligible to me, but after an hour's practice I was able to understand almost everything.

Chatterbee is an excellent learning tool for self-motivated adolescents and adults.

Unfortunately, the ability to understand Chatterbee seems to be directly related to how much exposure you've had to accents. After an hour's practice my children still thought it was talking gibberish about 10 percent of the time. To be fair about it, the fact that S.A.M. is able to produce speech that's intelligible even 90 percent of the time is one of the great programming feats of the decade, especially since the voice is generated entirely by software (no additional hardware is required).

The most serious problem with Chatterbee (other than the fact that a few of the words are misspelled) is

that it really isn't a game at all, but simply a thinly disguised drill. As drills go it's an excellent one, but it's not the kind of game that most kids are going to rush home to play. After spending five minutes with the program my six-year-old announced that he was "*very* bored" and promptly fled the scene. His twelve-year-old sister lasted only ten minutes longer. I really don't blame them. You can't expect kids that have grown up on Star Raiders and Pac-Man to be held spell-bound by a game that has no story-line, no antagonist, little action and no real object.

In short, Chatterbee is an excellent learning tool for self-motivated adolescents and adults. If you're buying it for children it's still a good investment, but be prepared to spend some time helping and encouraging them.

DELTA DRAWING

Spinnaker Software
215 First St.
Cambridge, MA 02142
(617) 868-4700
$49.95, 16K—cartridge

Reviewed by John & Mary Harrison

Delta Drawing is a turtle graphics language simple enough for our children to enjoy and rich enough for us to find challenging. Unlike other turtle graphics implementations, the Delta turtle responds to single letter commands: D for Draw, E for Erase, R for Right, L for Left, etc. And there is no penalty for pressing a non-functioning key.

Merely by pushing a few keys, our three-year-old can actually make the computer do something. He likes that. Our seven-year-old has learned to plan her pictures and is becoming aware of how small ideas can lead to big results. These works of art (stick men can be beautiful) can then be saved on disk and called up for later display.

It would be misleading to think of Delta Drawing as just a fancy doodling program in color. It is an excellent introduction to the whole concept of programming. Simpler than Logo, it appeals to children too young to spell as well as older children and adults. A maximum of four turtles can be displayed and moved simultaneously. This teaches symmetry while producing striking and sometimes unexpected results. Other features include the ability to enlarge, shrink, or reverse pictures using simple commands. Up to nine pictures can be developed and saved in a process that is transparent to the user. These procedures are named X1 to X9 automatically by Delta Drawing as they are saved. The user references one of

> Delta Drawing is an excellent introduction to the whole concept of programming.

these procedures by calling its name as another Delta command. The Editor provides a text mode for the creation and editing of Delta programs without redrawing the entire picture.

The packaging and documentation are excellent. All of Spinnaker's products are packaged in firm reusable plastic boxes which encourage proper care. The documentation consists of a small spiral-bound book and a quick reference card. Each of the commands is illustrated in step-by-step examples that fully describe the capabilities of Delta Drawing. Thus it is possible to be creating exciting visual displays while still learning how to use the program.

Delta Drawing is a powerful education tool. It is not intended to replace BASIC or Logo, but can be used effectively to lay a firm foundation for the future study of these and other languages. Drawing pictures is fun. By the use of simple commands, Delta Drawing encourages organizational skills and procedural thinking even in the very young. It is well worth the purchase price.

LITTLE RED RIDING HOOD

Playground Software/
Futurehouse, Inc.
310 W. Franklin
Chapel Hill, NC 27514
$29.95, 48K—disk

Reviewed by Bill Lukeroth

Little Red Riding Hood falls short of its claims to be an "interactive and educational" bedtime story that uses the S.A.M. software voice synthesizer for narration and the Edumate light pen for input.

Actually Red Riding Hood does little to involve children in what is a simple narrative story. "Interaction" occurs only occasionally as the story pauses and requires you to touch the screen with the light pen or to push the joystick button to continue.

There are no decisions, no questions and no alternatives to involve you while running this product with its crude graphics and the thick accent of S.A.M. It is difficult to see how this software is an improvement over traditional non-computerized storybooks.

Following the "story telling" are three allegedly educational games—simple "find the letter" games that are no improvement over similar public domain games widely published in computer magazines. Two games don't even bother to keep score.

I doubt that Red Riding Hood would interest any child old enough to master the light pen. I think the

continued on next page

product reviews

money might be better spent on a good storybook and a subscription to **Antic**.

READING COMPREHENSION SKILLS & LEARN ABOUT WORDS

American Educational Computers
2450 Embarcadero Way
Palo Alto, CA 94303
(415) 494-2021
$39.95, 48K—disk

Reviewed by James Trunzo

American Educational Computers has a series of new programs in the language arts area, an area surprisingly neglected in teaching software.

Two of the programs released in the **Easy Reader Series** are **Reading Comprehension Skills** and **Learn About Words**. Each package offers a wide variety of programs on a double sided disk, with every program addresssing a particular topic.

Reading Comprehension (grades 1 to 3) consists of eight individual programs such as Main Ideas, Sequence of Events, and Cause and Effect. Learn About Words (grades 2 to 4) is a nine program package covering such diverse topics as prefixes, suffixes, root words, syllabication and more.

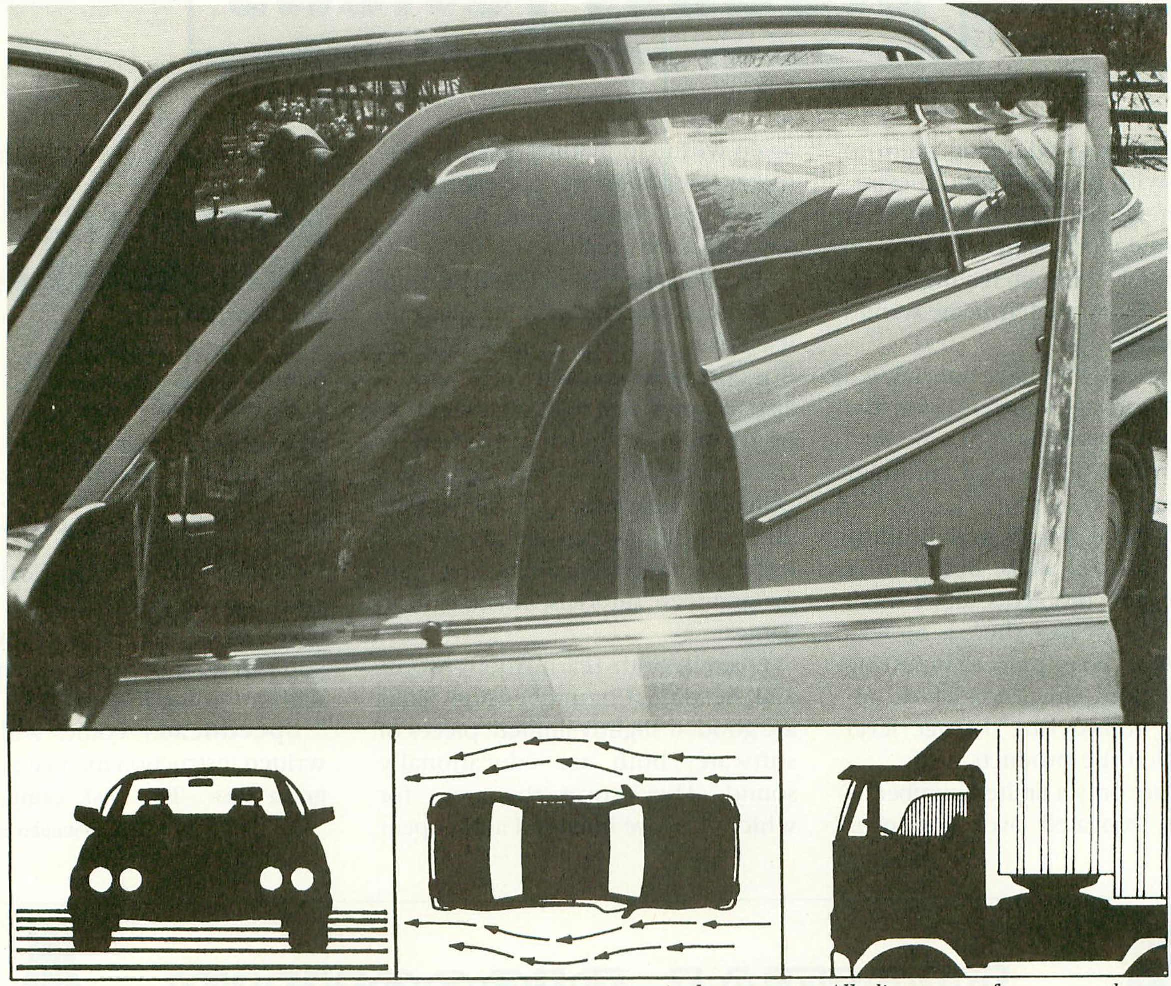
One strength lies in the number of different ways an area is approached. For example, when working in the Main Ideas segment of Reading Comprehension, one might be asked to (a) select a title for a short paragraph, (b) find the main idea among three related sentences, (c) answer questions on a short paragraph, or (d) answer questions on a long paragraph.

In addition, the two programs offer both audio and visual reinforcement for correctly achieving a goal (giving

> One strength lies in the number of different ways a language arts area is approached.

a certain number of correct answers consecutively) while foregoing any embarrassing computer generated "raspberries" when questions are answered incorrectly. Also, they track

continued on page 80



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Year ________ Model ________ 2 dr ( ) 4 dr ( )
Name ________
Address ________
City ________ State ________ Zip ________

student progress, allowing them to pick up with the last lesson successfully completed. This allows the user to continue work using a succession of programs without having to reboot the system each time he wishes to change lessons.

However, as with most educational software packages currently on the market, the programs from American Educational Computers have their weaknesses.

Learn About Words and Reading Comprehension Skills both suffer from the same problems, albeit small ones. In many cases, there is no way to correct an error prior to inputting your selection. This seems a little unforgiving considering the age level with which the products deal.

There are only a limited number of exercises, repeated over and over again within individual program segments. Although the packages offer variety and depth overall, the separate lessons do not.

The documentation could be more helpful. Even though the program itself uses screen prompts, confusion does occur here and there. It should also be noted that with the exception of the unit on Similar and Different, the programs are not graphic-oriented. However, this isn't necessarily a weakness considering the subject matter and recognizing that these programs are tutorials, not education games.

Overall, both Learn About Words and Reading Comprehension Skills are good, if slightly limited, pieces of software; both are educationally sound. They cover the areas for which they are intended and appear to be worth the $39.95 asking price.

SPEEDREAD+ MEMOREASE+

Inet Corporation
536 Weddell Drive
Sunnyvale, CA 94086
(415) 797-9600
SpeedRead+, $64.95, 16K—disk
MemorEase+, $79.95, 16K—disk

Reviewed by Michael Ciraolo

Would you like to dramatically boost your reading speed? Do you want to have a more powerful memory? Now you can do it at home on your Atari without going to expensive classes.

SpeedRead+ comes with a well-written instruction manual and a program disk. The disk contains text

continued on page 82

continued from page 80

selections presented in several formats. These formats teach different aspects of speed reading: single-phrase teaches rapid character and word recognition, double phrase helps develop eye movement and timing, random phrase expands peripheral vision, and column format offers practice in reading full-page text. Of course, the computer tells you how fast you are reading.

Selections from common literature are flashed on the screen in the format you select. You also select the flash rate and can control several variables with a joystick. Having the computer flash short stories is an excellent way to unlearn some of the bad habits many of us have developed that slow our reading speeds.

An excellent way to unlearn some of the bad habits many of us have developed.

SpeedRead+ is a well-crafted tool: based on my own experience, it works. Only 15–20 minutes a day are needed and when you run out of the text provided with the software, you can insert more of your own.

MemorEase+ is as well designed as the reading software but rests on a shakier principle. MemorEase+ presents text in various formats on the screen, then when you press a key, part of the text disappears. You read the selection over and over again, pushing the key when you are ready to lose a random part of the material. You can always back up and see what has already faded.

Like SpeedRead+, MemorEase comes with a well-written, useful instruction booklet.

THE ART OF COMPUTER GAME DESIGN: REFLECTIONS OF A MASTER GAME DESIGNER

by Christopher Crawford
Osborne/McGraw-Hill
2600 Tenth St.
Berkeley, CA 94710
(415) 548-2805
$14.95, 112 pp., preface, index

Reviewed by Christopher F. Chabris

Chris Crawford, former head of Atari's Games Research Group, is best known as the avant-garde programmer who created **Eastern Front 1941** and **Excalibur**—inventing the whole scrolling map strategy format. Such efforts qualify him as a "master game designer," and this book establishes him as an author and programming philosopher. The Preface states that the book's purpose is to contribute "principles of aesthetics, a framework for criticism, and a model for development" for computer games. Crawford achieves these goals without lapsing into overly technical discussion of some of his more intricate algorithms; he demonstrates admirable restraint in sticking to his topic.

The book's organization is straightforward: Crawford begins by defining the word *game* and proceeds to specific principles of game design and a prediction of the future of computer games. He also includes a discussion of the development of Excalibur, a chapter similar to Crawford's magazine articles (See **Antic**, December/January 1983) on his earlier games. It is an interesting case study of Crawford's ideal game design sequence.

The chapter entitled "A Taxonomy of Computer Games" is out of place despite the nice color photographs of game screens. Although it fits Crawford's overall goals for the book, much of this chapter's contents are self-evident ("combat games present a direct, violent confrontation"). I was also disappointed to find a few minor inaccuracies. For example, Crawford states that **Dungeons & Dragons** can become tedious because of "lengthy computations . . ." In my experience with the game, adding up a few one-digit numbers is about as involved as the computations become. The 21 pages of this chapter could have been put to better use.

Crawford's programming genius and writing style enliven chapters on game design precepts, ideals, and methods. He uses well-chosen references to specific Atari games to explain such concepts as "Maintaining Unity of Design Effort" in ways that are familiar and universally applicable.

Crawford's programming genius and writing style enliven chapters on game design precepts, ideals, and methods.

Chris Crawford should be congratulated for "revealing his secrets" and bringing serious insight to an area widely perceived as frivolous. It is evident that Crawford spends as much time thinking about the implications and future of the computer game art as he does about the code itself. Although it is not perfect, I recommend The Art of Computer Game Design to anyone interested in this "silly fad."



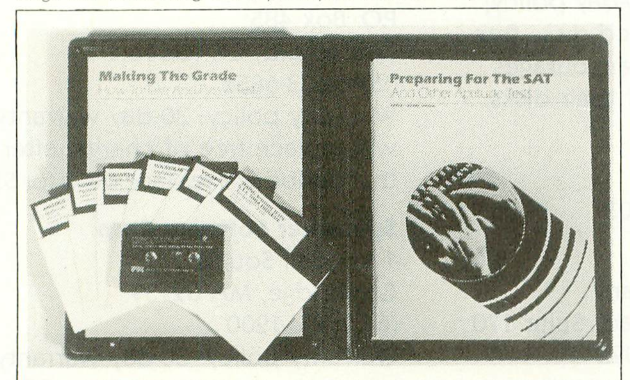
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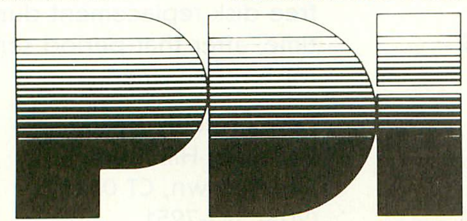
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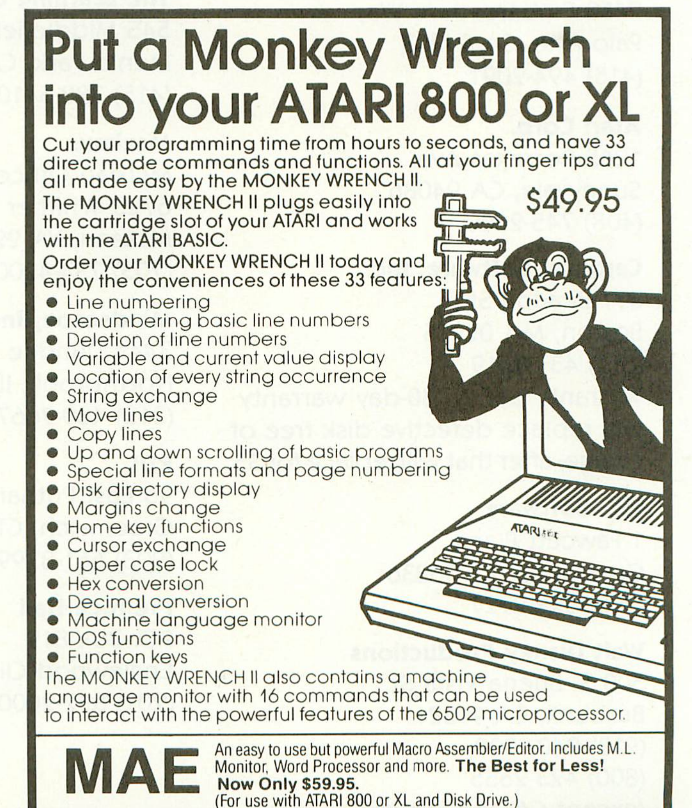
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continued from page 34

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Most companies cover their products with a standard warranty: they will replace a defective disk free of charge within 90 days of purchase. After that, there is a nominal charge for a new disk, generally between $5 and $10. All companies below are covered by a 90-day warranty *unless* noted otherwise. Consumers may contact the manufacturers for more detailed information.

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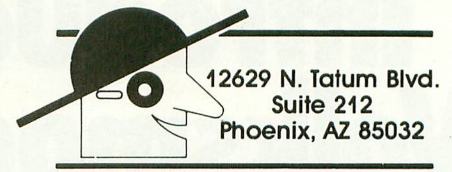
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ANTIC 4/5 EDITOR/ANIMATOR
continued from page 44

and the ATASCII table, this means that the dot "window" uses CHR$(0) to CHR$(5), and the eater uses CHR$(6) to CHR$(11).

Next, I established pointers to the various animation frames being used. The eater uses ten frames. Line 234 uses the index I to set up array ES (Eater Sequence) with the locations of these frames in the animation set. Line 232 does the same for five frames used in the animation sequence for the dots. The two animation sequences use figures 0 to 9 and 10 to 14 respectively. Once the eater and dots are on the screen, USR calls to the machine-language routine COPY animates them rapidly. The eater is animated with lines 22 and 24, and the dots are animated with lines 26 and 28.

MOTION

DEMO.BAS uses the fairly slow technique of printing, erasing, and printing in a new position to move the eater around the screen, which is achieved in the subroutine in lines 10 to 18. You could obtain much faster motion by writing a specialized USR routine to POKE the fixed values that define the eater into screen memory at the desired position. If you want to be able to tell when two objects on the screen have collided, use LOCATE to check the eater's next position (actually, six locations) between the erasure and the redrawing. This does slow things down and cause "blinking" motion, though, so you might consider writing another USR routine to check screen memory.

As your first experience in using the Editor/Animator, create an animation sequence with ten frames (FN 0 to 9) for the eater, then a five-frame sequence (FN 10 to 14) for the dots. Save the figure using the [C] selection from the menu. Suppose you call it EATDOT. Now LOAD "D:DEMO.BAS" and change the file specification on line 414 to "D:EATDOT.2X3". The sample program will now use your animation sequences. By the way, HYPNO.2X3 has five frames of an "eater" sequence.

A common saying among programmers is that no program is ever completely finished, and this one is no exception. Since most of the program is in BASIC, feel free to alter its characteristics any way you like. I chose a two-by-three array for pragmatic reasons. Among the factors in my decision were the sizes of the different elements in the editor layout, the size of the actual characters, and the fact that you can use the two-by-three matrix to edit arrays of dimensions one-by-one, two-by-one, and two-by-two (but not one-by-two or one-by-three, because of the array's layout). If you want to change the editor's opening animation, design new sequences and change line 2810 in the editor to show the new name.

Paul Chabot is a professor in the department of Mathematics and Computer Science at California State University at Los Angeles. His Player/Missile Editor utility program will appear in our forthcoming book, Antic's Book of Games *(working title).*

listing continued on page 59

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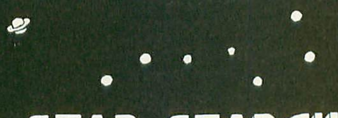
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new products

GP-700AT FULL-COLOR PRINTER

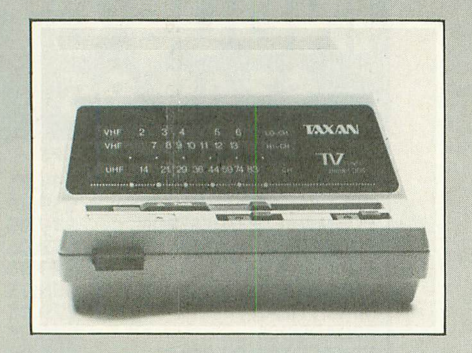
(printer)
Axiom
1014 Griswold Ave.
San Fernando, CA 91340
(213) 365-9521
$599



This Atari-compatible printer plugs into the computer's serial port without the 850 interface. It can print up to 50 characters per second, using a four-hammer print head and a cassette ribbon inked in black, magenta, cyan and yellow. Color mixes without smearing. The GP-700AT also prints alphanumerics, symbols and all types of graphic elements.

TAXAN 305 TELEVISION TUNER

(television tuner)
Taxan Corp.
18005 Cortney Court
City of Industry, CA 91748
(818) 810-1291
$129.95



The model 305 tuner turns any brand of composite monitor with audio into a color television of higher quality than most regular television sets.

COUNTDOWN TEST SIMULATOR

(educational software)
Tyson Educational Systems, Inc.
P.O. Box 2478
Miami, FL 33055
(305) 431-4268
For the Atari 800/1200/800XL, $49.95

Designed for children in grades K–12, Countdown allows teachers to write and edit banks of questions which are then used to test students with the computer. The game program keeps track of student and class results, and recycles frequently missed questions for improved learning.

PORTFOLIO MANAGEMENT SYSTEM

(personal business software)
Basic Byte, Inc.
P.O. Box 924
Southfield, MI 48037
(313) 540-0655
48K — disk — $39.95

The system is to include three volumes —Stock Management, Options Management, and Graphics Analysis—of which only the first is currently available. The Stock program calculates long and short term capital gains and losses, dividends, and price per share after broker commission on a portfolio of up to 100 individual stocks. Future volumes will provide similar portfolio support for the speculative options trader and graphics tracking ability for stock market trends and individual stock performance.

Return the favor. When you call a manufacturer or supplier about a product you've seen advertised or otherwise mentioned in ANTIC, please tell them so. This will help us to continue to bring you the latest information about products that will make your Atari computer an even more valuable investment in the future. —ANTIC ED

CORDLESS JOYSTICKS and STREAMLINE DISK DRIVE

(hardware accessories)
Percom Data Corp.
11220 Pagemill Road
Dallas, TX 75243
(214) 340-7081
Joysticks and receiver — $49.95
Streamline Atari disk drive — $419

Percom's remote joysticks use digital infrared transmission between a special receiver (plugged into the Atari) and the joysticks. The sticks are omni-directional in an average-size room and require no antennae.

The new double density disk drive features an internal controller, three slave drives, front indicator lights and a front-mounted power switch. Total capacity (formatted) is 176K bytes.

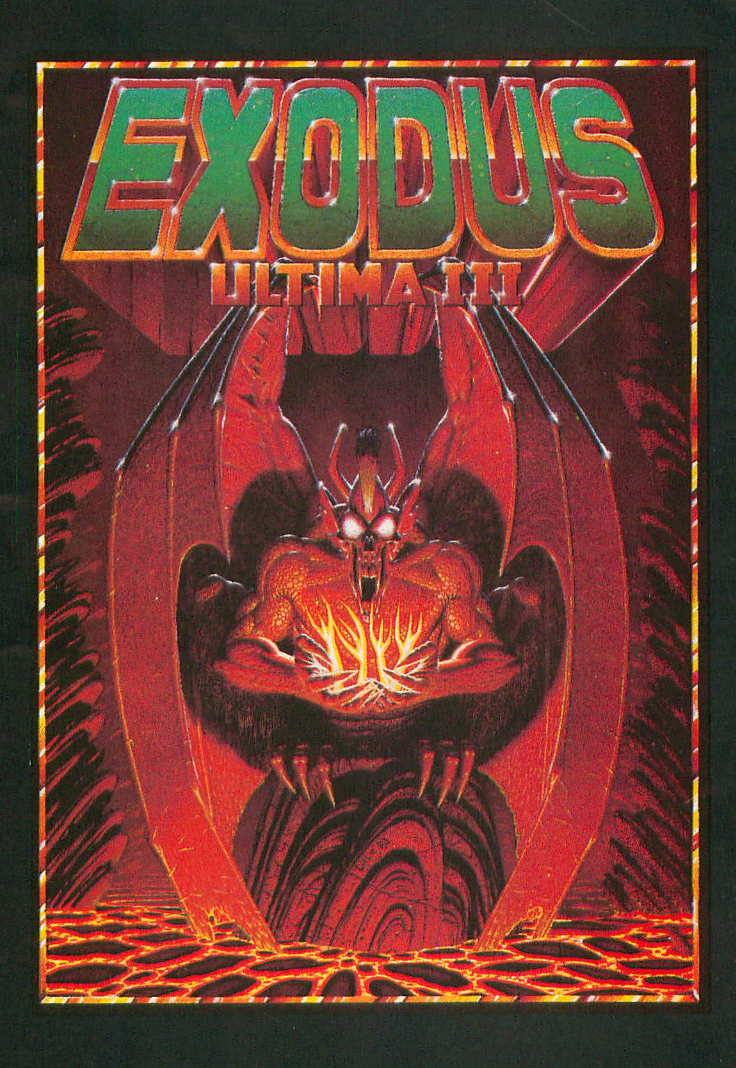
OKIMATE 10

(printer)
Okidata
532 Fellowship Road
Mt. Laurel, NJ 08054
(609) 235-2600
$239



This seven-pound printer produces full-color text and graphics at a rate of 60 characters per second. The ink and print head both come in easy, mess-free snap-in cartridges. The printer comes with a disk and cassette software package entitled "Learn to Print" and "Color Screen Print."

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"The world of Ultima III can only be compared to a living tapestry — complex and beautiful . . . This is the best fantasy game in computing. Indeed, it is one of the best fantasy worlds in which to live. Lord British is a veritable JRR Tolkien of the keyboard." — Popular Mechanics

"Exodus: Ultima III, with a superior plot to match its superior gaming system, is a great game. It upgrades the market; in several ways it sets new standards for fantasy gaming state of the art." — Softline

"Exodus: Ultima III is Lord British's magnum opus — so far. It's fun and exciting to play and constantly intriguing. And the ending is marvelously unexpected and not a bit disappointing — except that it is the ending, and as with a good book, you'll probably wish there were more." — Softalk

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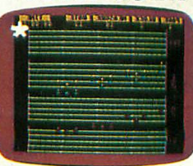
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